

The Iron Age

A Review of the Hardware, Iron and Metal Trades.

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The Fire Risks of High Buildings.

The *Journal of Commerce* says that the effective working power of fire departments seems nearly to have reached its limits. No improvement has been made for some years in the capacity and delivery of steam fire engines. Perhaps when some substitute is found better than water for the extinguishment of fires the present deficiency may be remedied. The acknowledgment of Chief Bates that the New York Fire Department has no means of controlling fires which occur in any part of a building over 75 feet high is an admission of great significance. In such a case the trouble is not to be met by multi-

Siemens-Martin Furnaces at the Graz Steel Works, Austria.

The Graz Steel Works of the Southern Railway Co., Austria, were established in the year 1862 with the special object of using up the old rails, tires, axles, &c., of the railway. A Bessemer plant was put up for this purpose in the year 1864, but in 1877 Mr. Prochaska, the director of the company, laid out the whole works anew for the manufacture of open-hearth steel in the Siemens-Martin furnaces. The steel works at present contain four furnaces—two of 12½ tons and two of 5½ tons capacity. Special attention was given to

of, instead of directly below, the furnaces, and the use of overhead gas flues is thus entirely avoided, the gases being conveyed entirely underground. The air and gas flues slope somewhat steeply down toward

Siemens-Martin furnace and the gas producers and cranes connected with them. In this view numbers 11 are the full gauge works lines for bringing in materials, situated a few feet lower than the general level of the

near end of which is placed a boiler which supplies steam to the pump 19, the latter in turn supplying the accumulator 20; 18 is the donkey pump for the boiler. The furnace marked 7 is a furnace for heating the pig before it is put into the melting furnaces, and this furnace, although really part of the complete plan, was erected only a short time since. The two 12½-ton melting furnaces are designated by the figures 8, 9, and are placed on the general ground level of the melting house, the regenerative chambers being in front of them and underground, with a straight lead from the gas producers. The gas chambers are the two outer ones, each set of four being marked 9, 9. The inner ones, 10, 10, are air chambers, as stated above. The valves and levers for reversing the passages are placed at 11, while the chimneys receiving the final products of combustion are marked 12. The tapping-holes of the two furnaces converge toward the ingot pit 13, which, as usual, is placed below the floor level, and is commanded by a ladle crane, 14, and three ingot cranes, 15. The former are controlled from the pulp-

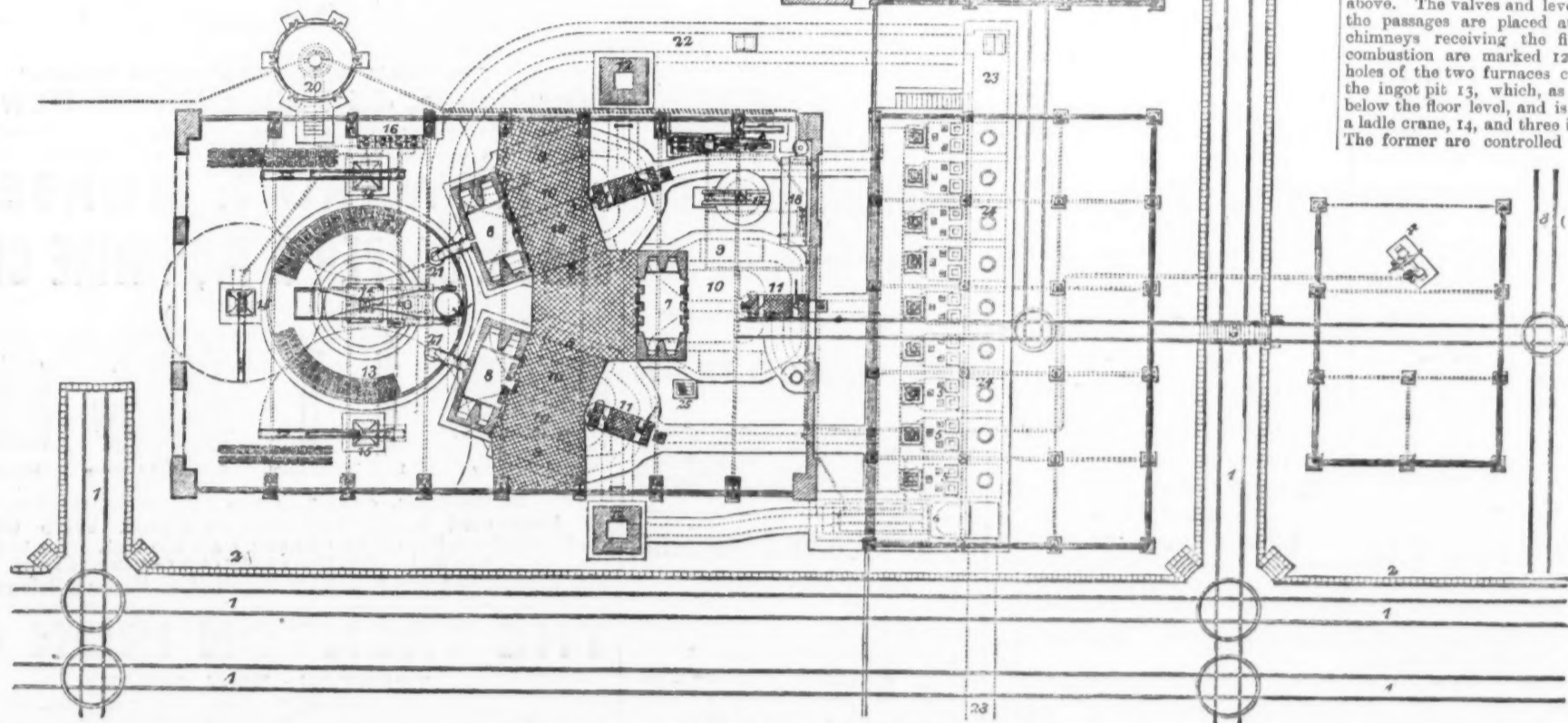


Fig. 1.—General Plan of Furnace, Gas Producers, Cranes, &c.

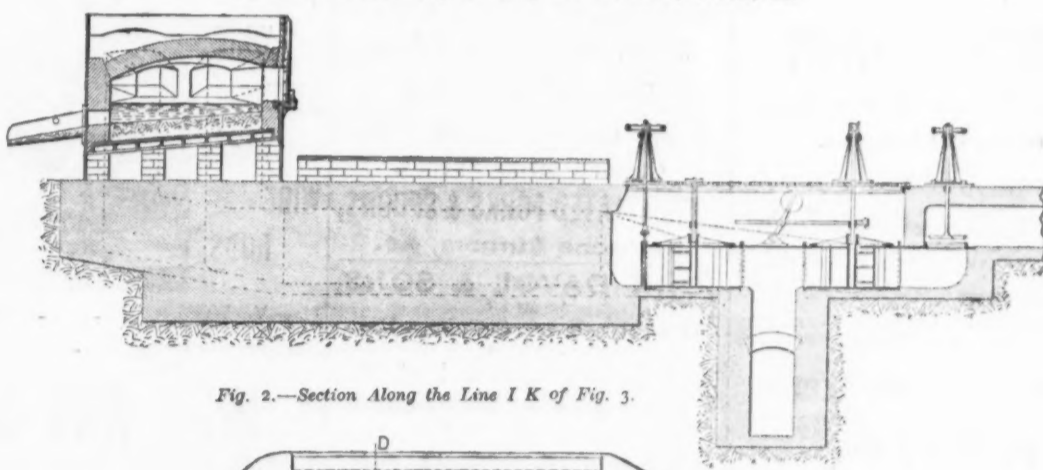


Fig. 2.—Section Along the Line I K of Fig. 3.

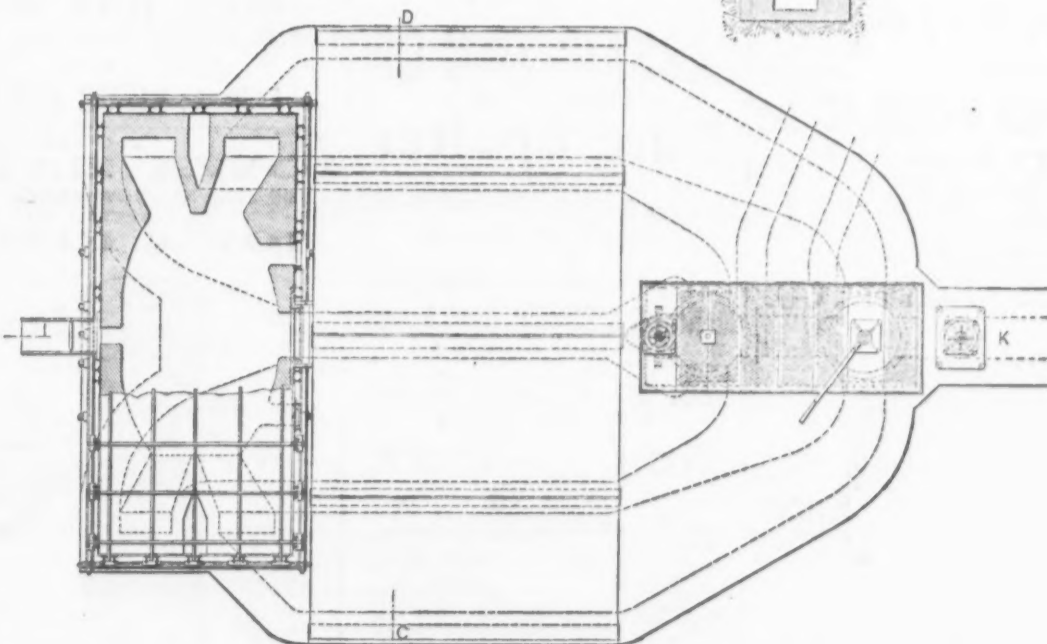


Fig. 3.—Plan of Furnace and Regenerators.

SIEMENS-MARTIN FURNACES AT THE GRAZ STEEL WORKS, AUSTRIA.

plying engines. Twenty machines will throw water upon and into a fire no higher than one machine. The extreme limit at which the apparatus can be made really useful is about 65 feet. It follows from these facts that all buildings (especially those destined to be occupied by human beings or to contain combustible materials in quantity) should be rendered fire-proof at least from a height of 65 feet upward. It may be said that all structures rising beyond that height should be fire-proof throughout, and this would be a precaution on the side of safety. But if the upper stories of the tallest buildings were incombustible, there would be a sense of security which is not now felt against a repetition of the Chicago and Boston fires in New York.

Referring again to the excellent reports and recommendations lately made to the Board of Underwriters, we find that there are only five strictly first-class fire-proof buildings in the great dry-goods district. The number over 70 feet high is 562, and of these 170 are over 80 feet high, 32 over 90 feet high, seven over 100 feet high, and one towers to 125 feet. Here, then, are numerous buildings, the upper stories of which, if in flames, would defy the best efforts of the Fire Department. A fire once thoroughly started in that district, with a gale blowing at the time, would sweep freely over these inaccessible roofs until checked (if at all) by a street space or by the blowing up of some buildings in the path of the conflagration. As the tendency of architecture in New York is toward structures of the loftiest class—for apartment houses and offices and other purposes—the necessity of making them fire-proof becomes more urgent. It is a very serious matter, to which neither the Fire Department nor the Underwriters' Board attaches no small importance. We are not surprised that the insurance companies are debating a proposition to charge in an increasing ratio for each 5 feet above 65 of height, except where buildings are absolutely fire-proof.

We commend the statements of Chief Bates and of the underwriters to the attention of the Senate committee who are now considering the scheme of a new building law. The builders and architects are making themselves heard before the committee with suggestions. Their ideas are valuable, but do not cover the whole subject. Owners and builders are naturally not in favor of making those large outlays which alone can give the fire-proof quality to the whole or any part of a structure. And architects may be expected to sympathize with owners and builders. The vast interests of the metropolis, which are all at the hazard of fire, should far outweigh those of the comparatively few who erect and own buildings in and out of the dry-goods district, and who are ready to pay any fines of insurance that may be imposed in preference to making their property strictly fire-proof.

the shape of these furnaces, and Mr. Prochaska, from whose designs they were constructed, made several changes in them which seem to have been most beneficial in regard to their durability. The regenerators, in the first place, are situated in front

the hearth and inward toward each other, but so that all the mixing of gas and air occurs in the hearth itself. The separating pillar between the flues is kept cool by making it hollow and allowing air to pass through it. Fig. 1 shows a general plan of the larger

shops 22. Narrow-gauge lines 33 serve for the actual transportation of materials within the works, the material being collected on the space on the right of the plan. At 4 is a rail-shearing machine used for cutting up the scrap; 55 are the gas producers, at the

16 on one side of the house. The shutes 21 carry off the slag into the slag canals 22 and 23, while the stores of clay and sand are kept at 26, 27 being the laboratory and testing-room. Figs. 2, 3 and 4 show the construction and relative position of the melting furnaces and regenerators, with their flues on a somewhat larger scale, Fig. 2 representing a section along the line I K, and Fig. 4 a section along the line C D, of Fig. 3. The latter is a plan of one of the larger furnaces and regenerators. A feature of considerable interest in connection with these furnaces is their extraordinary durability, which is ascribed by Mr. Prochaska to the arrangement of the gas and air flues, which, as already stated, slope inward and downward to the hearth, and are kept entirely separate, so that the gas and air do not mix until they actually have entered the furnace. An air space, Fig. 3, between the flues keeps the middle wall from destruction. It will also be noted that the roof of each furnace is arched upward instead of being tipped down, so as to more or less follow the line of the bed, and this is considered to have greatly contributed to the generally successful result. It is stated that in the different furnaces at these works from 400 to 600 consecutive charges have been run from one furnace without stoppage for repairs, and one of them recently ran 640 charges continuously.

The gas is produced solely from brown coal or lignites containing from 25 to 28 per cent. of water, no sulphur, and giving from 2 to 3 per cent. of ash. The deficiency of this fuel in heating qualities makes the time for working a charge somewhat long—from nine to ten hours. The charge consists of about 30 per cent. of pig (one-third gray and two-thirds white) and 70 per cent. of old iron and steel, in the shape of crop ends, scrap iron, old plate, &c., which is melted in three installments, and only the larger pieces are previously warmed, all the smaller material being put in the furnace cold. The melting is continued until the carbon is down to 0.12 or 0.14 per cent., and then spiegel is added, so as to bring the carbon up to the required amount. A very complete system of tests during the work has been arranged and is carried out. The two small furnaces produce about 8000 tons of steel per annum, and the two larger ones about 16,000, thus making in all 24,000 tons. For every ton of ingots there are used 667 pounds of pig, 1595 pounds of old iron or steel and 35 pounds of spiegel. For the same quantity, 1225 pounds of coal are used in the generator and 425 pounds in the boilers and elsewhere. The production of steel castings is very successfully carried out, the purity of the pig and its silicious nature being of some importance in the result. The method adopted is to run as much of the contents of the small ladle (from the 5½-ton furnaces) into ingot molds as may be required, to return the ladle, add ferro-silicon, melt close by in a crucible in a

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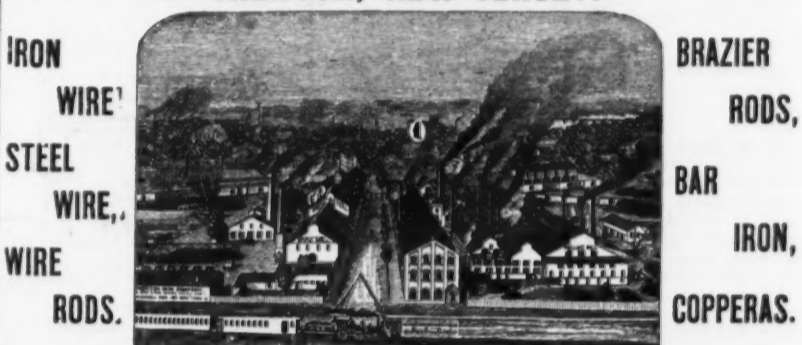
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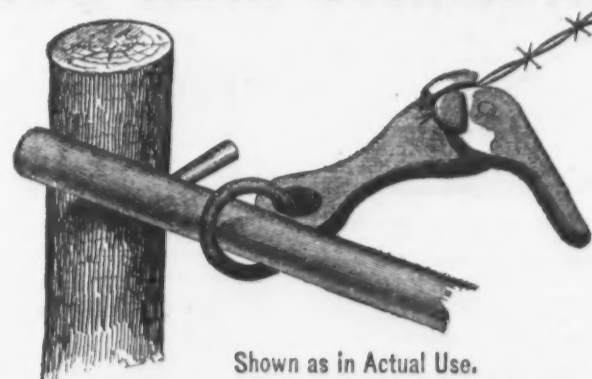
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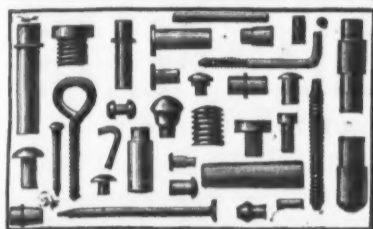


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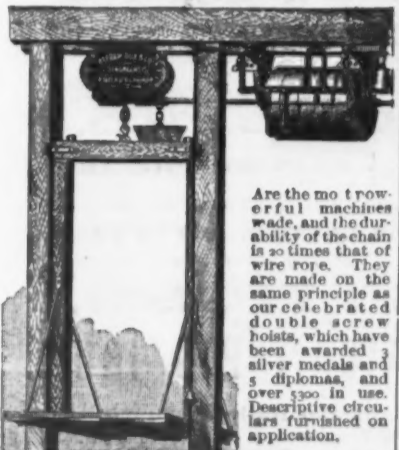
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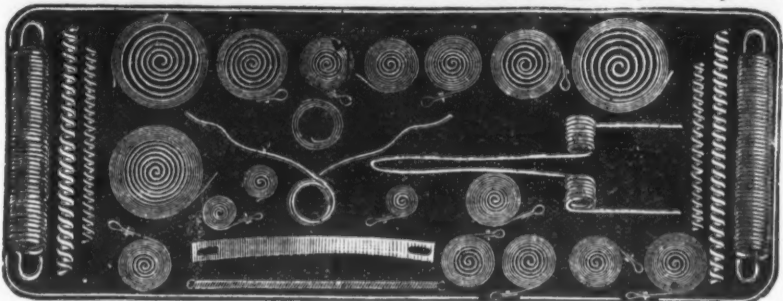
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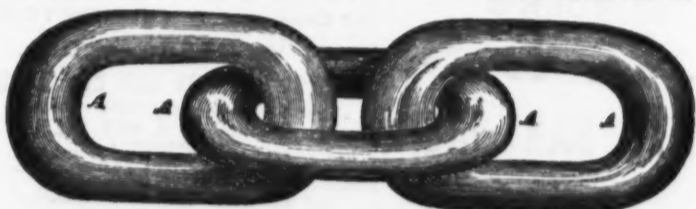
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little pot furnace, and then pour out at once in the molds. For four years past all the mill rolls have been made in this way, as well as a large number of other castings. The quantity of addition to a full ladle of 5½ tons of iron is 35 pounds of silicon, which would require to be added as 350 pounds of ferro-silicon containing 10 per cent. of silicon. The metal so cast has the following constitution and properties:

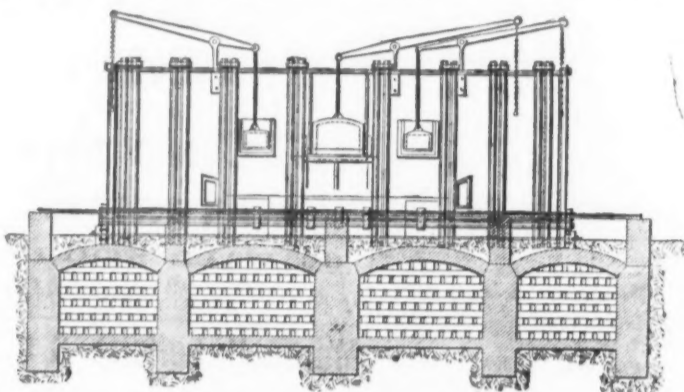
Carbon.....0.40 to 0.50 per cent.
Silicon.....0.30 to 0.40 per cent.
Manganese.....0.45 to 0.60 per cent.
Phosphorus.....0.05 to 0.06 per cent.
Tenacity.....38 tons per square inch
Elongation.....10 to 14 per cent. in 10 diameters
Contraction of area.....20 to 40 per cent.

When required, however, a very much harder metal is cast, one which contains about 0.6 per cent. of carbon, and can be used for tool steel.

In connection with the ingot crane of the two large furnaces, Mr. Prochaska has adopted the plan of filling the ingots (two at a time), not from the ingot ladle itself directly, but by the use of an intermediate vessel intended to break the shock of the metal cast as it generally is. This vessel is slung from the ingot ladle, and naturally lies just below it, between it and the ingot molds. The ingots are allowed to cool before taking them to the rolling mills. The heating furnaces for the cogging mill, of which there are two, are 26 feet 3 inches long and slope downward throughout their whole length. Each

hydraulic pressure riveting machine which could readily be applied at different points and over considerable areas, and at the same time maintain an uninterrupted connection with the accumulator pressure in the mains. The system had been extended to machinery of sufficient gap to span the deepest girders, the same hydraulic power which actuated the heavier machines being utilized for lifting them. The water driving these machines and their lifting apparatus was supplied under a pressure of 1500 pounds per square inch.

Among the different applications of these machines the author mentioned the riveting of locomotive boilers, the fastening of rivets in gun carriages and in agricultural machinery, their use for railway wagon work and for riveting ships. The substitution of hydraulic machinery for punching and shearing metals had been more gradual, but it had proved economical, and had been employed for shearing the links of chain cables 3 inches in diameter, both sides at one time. To obtain the full advantages due to the application of hydraulic pressure to machine tools, the system should be applied throughout the works. This had first been first carried out completely at the French naval dockyard at Toulon for building iron and steel war ships. A similar plant has since been erected at the shipyard of the Forges et Chantiers de la Loire, at Penhouet, near St. Nazaire, and another is now being con-



Siemens-Martin Furnaces at the Graz Steel Works.—Fig. 4.—Section Along Line C D of Fig. 3.

ingot is entered at the upper end and is worked down until it gets to the bottom end, from which it is removed to be clogged. Each furnace holds about 20 ingots at a time, which are, of course, repeatedly turned over and uniformly heated as they pass from one end to the other. From 70 to 80 tons of ingots can be passed through each furnace in 24 hours. The furnaces are partly heated by gas and partly by the direct use of lignite. The cogging mill is 3-high, with hydraulic tables, while the finishing mill is only 2-high and not reversing, the rails being sent back over the top. The engine for the cogging mill has cylinders 31½ inches in diameter and 49.1 inches stroke, and is provided with Sulzer valves worked by cam gearing designed by Mr. Prochaska, and so arranged that the attendant can alter the expansion as the rolls require more or less power.

Besides the chemical laboratory, the works have a testing department containing a Werder machine with a capacity of 30 tons per square inch. The establishment also contains engineers' workshops for dealing with the castings and other products, but these require no special attention. It should be mentioned, however, that Mr. Prochaska has very cleverly utilized old rails for columns, rafters and every conceivable purpose in the shops.

Hydraulic Machinery.

The productive power and efficiency of machine tools and of other labor-saving appliances worked by hydraulic pressure formed the subject of an interesting paper recently read before the British Institution of Civil Engineers by Mr. Truedell. The author in the course of his paper stated that some years ago he had occasion to design a machine which was required to exert a great pressure in a confined space, at a considerable distance from any shafting. The machine had to be portable, and to be capable of doing a large amount of work efficiently without the intervention of skilled labor. Such conditions were of common occurrence, and in this instance all were successfully fulfilled by the employment of hydraulic pressure. The paper was an amplification of the subject of the application of this power to actuating machine tools and other labor-saving appliances in engineering works, and was divided under three heads, namely, the introduction and development of hydraulic-pressure machine tools; the productive power and efficiency of machine tools generally and the modes of increasing them; and the increased productive power and efficiency obtainable by the employment of hydraulic pressure for working machine tools and other labor-saving appliances. Reference was made to the unpublished experience existing on these questions.

Under the first head an illustration was afforded by a small portable hydraulic apparatus for fixing the ends of boiler in tube plates, the pressure of water employed varying from 1 to 1½ tons per square inch. Owing to the introduction of high steam pressures, the castings of marine boilers had to be considerably increased, but the mechanical riveting machines formerly in use were mostly inadequate to make steam-tight joints. In 1865 the author designed a hydraulic riveting plant to overcome the difficulty. It consisted of pumps, an accumulator and a riveting machine, and in operation was seven times more economical than handwork; moreover, its surplus power was available for hydraulic presses for "setting" or joggling, angle and tee irons. In action it was found that the material was much less strained, and that the wear and tear of the molds and dies was greatly reduced, besides which the machines were moveable. Previous attempts to perform similar work by portable machines driven by steam had not been very successful. This, it was believed, was the first

constructed at Brest from the author's designs. Other applications of hydraulic pressure were then referred to, such as for forging and stamping. Mr. Truedell held that the successful carrying out of hydraulic forging would depend greatly on the skill brought to bear in making the dies and molds. As to the productive power and efficiency of machine tools generally, and the mode of increasing them, the author observed that the cost of manufacturing depended upon the productive power of the tools employed, and upon the possession of facilities for transporting the material to and from them. At present a large amount of lifting was done by manual labor, in which there was room for great improvement. Owing to the necessity hitherto of using belting or gearing for working them, power cranes had been applied to machine tools as a means for increasing their output only to a limited extent. The author pointed out that by the adoption of portable hydraulic machine tools a great saving in floor space might, moreover, be effected. The introduction of hydraulic capstans had practically annihilated space in dock and railway yards, and as the haulage of a given weight on a good road required less power than lifting it, an extended application of such machinery to engine works was to be anticipated. The suitability of this system to increasing the output of large engineering shops and shipyards was evident, and safety in lifting was insured in hydraulic cranes by the impossibility of workmen putting on them a greater load than they were calculated to bear.

So far as the increased productive power and efficiency obtainable by the employment of hydraulic pressure for working machine tools is concerned, the author observed that the power necessary in a hydraulic system to pump water into the accumulator was nearly always obtained from a steam engine; but even at this early stage the hydraulic system, by the use of the accumulator, allowed of a considerable reduction in the size of the motor. A comparatively small prime mover running continually can store up sufficient energy to meet any sudden demand from even the largest of the machines worked from it, while, on the other hand, the prime mover would have to be equal to this. This defect was to a small extent met by the use of fly-wheels, which were, however, objectionable from their liability to accidents, and from the strains to which the shafting was subjected. From 200 to 300 blows per minute had been obtained in hydraulic machines, and in machine tools and cranes the accumulator acted as a perfect safety-valve. Then, for the transmission of power to points distant from the prime mover, hydraulic pressure is the most economical. By the use of hydraulic mains laid underground all overhead shafting may be dispensed with. Under the present system, the lines of shafting to a great extent regulate the position of the machines. In a recent case 48,000 square feet were required with shafting, while 32,000 square feet only were necessary when arranged for hydraulic transmission. In this case the cost of all the roofing and flooring of a building 300 feet long, 53 feet wide and 25 feet high was saved. A pipe of 1-inch bore can transmit nearly 6.5 horse-power at a very moderate velocity of water, and a 2-inch pipe about 25 horse-power. All danger from use of belts and pulleys is avoided, and when once laid in the ground it needs no further attention.

The next question was as to the suitability of hydraulic pressure to actuating the tools. It has already been employed for slotting and planing machines, and its application to rotary machines might even become as economical as any other. The simplicity and small number of parts in all hydraulic machine tools was a source of great economy. In respect to the economical application of force through each individual machine when

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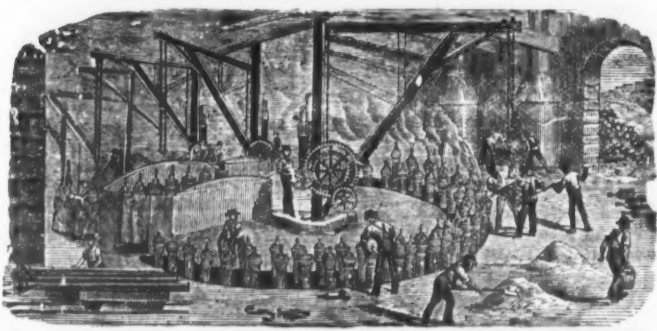
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performing such an operation as punching,
the machine was moving at its lowest speed,
and friction was at a minimum when most
work was being done. Again, hydraulic
machines consumed no power except when
actually doing work, while it was not un-
usual in a machine shop to see all the shaft-
ing running in order to drive a small tool at
its extremity. With hydraulic machines it
was immaterial whether the machine was 2
feet or 2000 feet from the accumulator—only
the exact quantity of water necessary to
perform the operation was consumed. In
conclusion, the author stated that, apart
from questions of economy, attention might
be directed to several of the advantages aris-
ing from the application of hydraulic power
to special cases. In riveting machinery it
rendered it possible in one and the same
machine to close the plates with a steady
pressure, to fill the rivet-hole without
forcing the metal of the rivets in between
the plates, and to give the metal a sharp
blow. Not only could the heaviest machine
be lifted, but the machines could be attached
to their work. In punching and shearing
machinery much greater accuracy was in-
sured from the perfect control of the moving
punch or knife, the descent of which could be
arrested even after it had touched the plate.
Steel plates were less injured when punched
by steady hydraulic pressure. Hydraulic
punching and shearing machines, moreover,
required no foundations, and could be readily
taken on board ship, thus saving much car-
rying to and fro of plates. It was often de-
sirable to follow up the effects of a sharp blow
by maintaining a continued steady pressure.
This was illustrated by the author, who de-
scribed an "impact" accumulator, and
pointed out the difference of effect of a num-
ber of light blows, as compared with one he-
vy one, in the case of hydraulic riveting. The
indirect advantages due to the uniformity
of all the work applied also to the flanging
machinery, and, in fact, to everything passing
through dies and blocks. He thought that
even small firms might find it advantageous
to combine in the erection of a common pump-
ing station, and so to obtain many of the
economical benefits due to carrying out oper-
ations on a large scale.

Gaseous Fuel for Boilers.
In some particulars the use of gaseous fuel
under boilers has been a well-established
practice for many years. Waste gas from
blast-furnace stacks has been thus employed
from a very early day in the history of the
iron manufacture in this country. This
waste gas cannot compare very favorably
with the gas which would have to be fur-
nished for general public use as a fuel gas,
for, apart from its absolute chemical compo-
sition (which alone would bar it from such
use), it carries with it from the interior of
the furnace a fume or fine ash, which is very
persistent in its refusal to be washed or fil-
tered out. Hence all, or nearly all, the de-
tails of the boiler house at blast furnaces are
changed from what is found to be desirable
and economical in other general use. The
boilers themselves, in the large majority of
cases, are comparatively small in diameter
and very long, the external surface of the
shell alone being used as heating surface.
The difficulty—nay, impossibility—of clean-
ing them thoroughly from this light, flocculent
dust prevents the use of any tubes or other
form of internal heating surface, so that
even for a moderate total capacity of boilers
the plant becomes quite extensive, with the
needful lines of pipes for steam, for feed-
water and for blowing off.
Hence, in the introduction of gas for
general heating purposes in factories, and
in similar places for which the demand
would not be so great as to reach beyond
the probable capacity of a public works for
its supply, the whole problem opens itself as
a fresh, almost untrodden, field to the en-
gineer. The list of devices for burners and
for supplementary fixtures for gas furnaces
is already an extensive one, but the actual
use, on an important working scale and
under the rigid conditions which a meter-
measured supply of gas would compel, is
very limited. The ingenuity of designers
will therefore be sure to be drawn upon
again to a certain extent in the former
lines, but the chief requirements, to which
their work will undoubtedly be held very
rigidly, are certain to lie in the direction of
very close economy, or, more correctly, in
the direction of providing for an exact
knowledge of the work done, which, as has
been so often said, is the foundation stone
in such matters of all economical working.
Some of the childish disputes as to quality
of coal furnished will be relieved when gas is
brought in from works sending out a product
measured by millions daily, and so, also,
will there be an end to the statements,
which are pretty hard reading even in an
advertisement, that waste heat can be uti-
lized under a boiler after the "Siemens
method" of melting steel.
It goes almost without saying that, so far
as the art of gas-making has yet advanced in
the industrial world, the only gas likely to
be distributed in pipes, in the ordinary sense
in which distribution is spoken of, is the so-
called "water-gas," for the manufacture of
which some very large producers are already
in successful operation. This element has
the remarkable quality of being a purer fuel
than any other now available for industrial
use—even wood itself, now so rarely em-
ployed, hardly excepted. It is also a favored
material, in that its quality can be controlled
or assured very completely by the conven-
ience of the machinery or the fixtures by
which the working of the apparatus is car-
ried on. In fact, the development of the
water-gas producer, which is still advancing,
is in a very important sense the adaptation
of machinery and all the accurate adjust-
ments or manipulations which machines per-
mit to an art in itself simple enough, but,
as practiced for many years, crude in its
apparatus and as thoroughly conservative
and non-progressive as any art yet known
to man. These general considerations have
no direct bearing upon the exact topic of
this note, but the practicability of the use of
gas under boilers, and in similar large man-
ufactures in a public way, depends absolutely upon
the cost of the gas as well as upon the char-
acter and the perfectness of the fixtures, and
hence a discussion of one involves the other
at nearly every turning.

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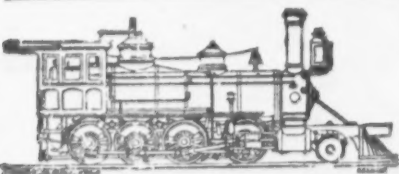
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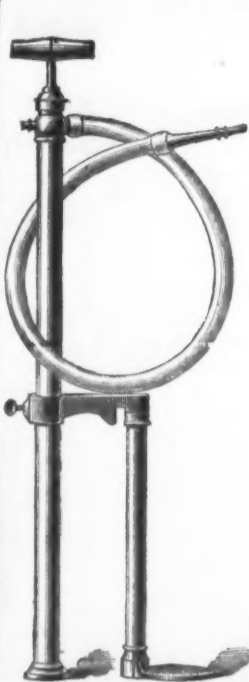
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On the Crystallization of Iron and Steel.

BY ALBERT A. HILL, C. E.*

The constantly increasing use of iron and steel in the arts and in construction is largely due to that close study of the internal structure of the material toward which investigation has of late years been directed, and from which have resulted improved metallurgical processes, a more accurate knowledge of the physical properties of the material and a clearer perception of its capabilities.

The test-tube, crucible and retort, the microscope and the testing machine, have all been pressed into service, and form the heavy ordnance which is slowly battering down the wall that separates speculation from knowledge. And yet, with all the improvements made in the production of iron and steel and in the manipulations of the metal in the blast furnace, the mill and the shop, we have barely reached the threshold of the knowledge which is requisite to a complete utilization of the material, which means minimum of metal combined with maximum of efficiency and of durability.

This question of durability opens a field of investigation, the final results of which will be decisive as to the degree of permanence to be looked for in structures of iron and steel.

Our present methods of dimensioning are based entirely upon such physical properties of the material as it possesses—or, rather, is supposed to possess—at the time it enters the structure. Of course, we distinguish between temporary structures, such as engines, machines and tools, and permanent structures, such as bridges, roofs and floors. For the former we dimension the several parts so as to be assured of a certain limited amount of service, expecting to replace after a certain length of time certain parts of the machine rather than to make the structure clumsy and unwieldy. In the latter, on the other hand, we endeavor to give the several parts such sectional areas as shall successfully resist an infinite number of repetitions of the normal strains and shocks which they are designed to resist. But in all cases our calculations are based upon more or less supposititious properties of the material—that is, if we use tough and fibrous iron or steel in the manufacture of a part or member of a structure, we suppose that the finished product, after undergoing all the manipulations by which it was fashioned into its ultimate shape, still possesses the strength and all the distinctive features of tough and fibrous iron or steel.

And so it comes that unexpected and perhaps disastrous failures in well-designed structures are frequently explained on the ground of changes in the internal structure of the material, most prominent among which is the alleged crystallization of iron and steel in consequence of vibrations and repeated shocks.

There is no question that molecular changes take place in iron and steel under certain conditions of service; neither is there any doubt that these changes are accompanied by deterioration of the material. This granted, it needs no argument to show how imperative it is that investigation should positively establish, first, the nature of the changes that can take place after the material has entered the structure; and second, what, if any, allowances in dimensioning will prevent these changes. In order to form a correct estimate of the nature of the changes which the internal structure of a piece of iron or steel has undergone during service, it is evidently necessary to know positively what the internal structure of the piece was at the time it was put into service. Until this point is settled and completely removed from the realm of supposition, it is simply idle speculation to talk of the effects of certain kinds of strains upon the internal structure of the material.

The fact that thoroughly fibrous iron or steel was used in the manufacture of a connecting-rod, a piston-rod, a tie-rod or an eyebolt, for instance, furnishes no foundation whatever for the supposition that the finished rod or bar was thoroughly fibrous at the time it was assembled into the engine or the bridge; nor, in case of failure, is the fact that the fractures of this rod have a crystalline appearance any evidence whatever that the rod was originally not made of fibrous material, or that the strains to which it was subjected had changed its internal structure from the fibrous to the crystalline; and last and not least of all should the crystalline appearance of a fracture be accepted as proof of the presence of genuine crystallization in the material under consideration.

Too much stress cannot be laid upon this last fact that crystalline appearance of a fracture does not necessarily indicate genuine crystallization; to the erroneous belief that it does may be safely ascribed most of the fallacious views held in regard to the effects of vibratory strains or shocks.

In illustration of these statements I desire to call your attention to some cases in point which have come under my personal observation. As regards the fact that the use of good material is no criterion of the quality of the finished product, I recall the failure of the tie-rods in some cast-iron arch girders made at a prominent architectural iron works. This kind of girder is the most usual form of construction adopted for the support of the front walls over stores, or other large openings in city houses, and the wrought-iron straining rods used in them have usually upset heads welded on to the ends of the rod, which is used of the proper size just as it comes from the rolls. The firm in question having occasion to test some such girders up to the point of rupture, were surprised to find that the tie-rods began to fail under a pull of a little less than 40,000 pounds per square inch of effective section, and that the fractures were short and decidedly crystalline. As the iron came from one of the best-known rolling mills in the country, was warranted to test up to 50,000 pounds per square inch, and as a great deal of this same iron was used by the firm in roof and other truss construction, the unexpected failures of the straining-rods naturally created some uneasiness and distrust of the quality of the iron furnished by the rolling-mill company. I was called in to make

some tests of the broken rods and also of some of the iron as yet unused. The result of these tests showed that the iron sent by the rolling mill was of excellent quality and fully up to the standard of the guaranty, the fractures of every one of the test pieces showing fibrous and silky. Notwithstanding all this, a rod selected for the exceptionally good results obtained from the tests of its ends, on being put in one of the arch girders as a straining rod, failed again under a very low strain, and the fracture, occurring near the middle of the rod, was short and crystalline.

A longitudinal section through the rod near the point of fracture treated with acid showed genuine crystallization, while another section taken through the weld and also treated with acid showed fibrous, and gave every other evidence of excellent workmanship on the part of the blacksmith. Acid treatment of other sections of this and of some of the other rods developed the thoroughly fibrous character of the iron. I concluded to make one more trial before confessing my inability to account satisfactorily for this strange behavior of the iron, but resolved this time not to lose sight of the rod for one moment from the beginning to the end of the experiment. This resulted in establishing the cause of the trouble. As is well known, the straining rods are shrunk into the cast-iron girders—that is, the rod is moderately heated till sufficiently elongated for the heads to enter the recesses in the toe of the girder, and thus after cooling fits tightly, and impart the requisite strain to the cast-iron arch. The blacksmith in the fitting shop, in order to accomplish this work as rapidly as possible, had hit upon the brilliant idea of putting the middle of the rod in a short fire, let on the blast and heat about 18 inches of the rod to almost welding heat, or at least above a scintillating bright red. This result was quickly reached and there was no difficulty, with that heat on, to fit the heads into the girder, but the rod on cooling did not strain the arch, but, on the contrary, was strained itself, as was shown by a slight reduction of its area at the heated part, and, moreover, allowing the iron to cool quietly from such a high temperature without working it, furnished the requisite explanation for the local crystallization observed. The man was instructed thereafter to arch his fire and pass the whole rod through it back and forth, until a uniform low red—in the dark—was reached. This gave the requisite elongation without any dangerous local heating, and ended, as I believe, all further complaints about the iron. Here, as in many similar cases, superficial investigation would probably have resulted in condemning the quality of the iron—in fact, judging only by the appearance of the fracture and mode of breaking, no other conclusion would have been possible. Or, if the girder should have failed after some years' service in the structure, and the good quality of the material used could have been satisfactorily established, then the usual explanation of crystallization from vibration would have been offered, and the girder—instead of the blacksmith—been made a shining example of.

On the other hand, that the crystalline appearance of a fracture is not necessarily an indication of the presence of genuine crystals is proven by the well-known fact that a skillful blacksmith can fracture fine fibrous iron or steel in such a manner as to let it appear either fibrous and silky, or coarse and crystalline, according to his method of breaking the bar. On the other hand, where there is genuine crystallization, no skill of manipulation will avail to hide that fact in the fracture. The most striking illustrations of this that have come under my notice are the fractures of the beam-strap of the steamer Kaaterskill, and of the connecting-rod of the chain-cable testing machine at the Washington Navy Yard. The photographs of both fractures are submitted to you, and the similarity of their appearance is most singular. Yet what a difference in the development of the longitudinal sections by acid treatment, which are also presented to you.

In the Kaaterskill accident the fractures of both the upper and lower arms of the strap were found to be short and square. A straight-edge put alongside the remaining parts of the strap showed that no bending whatever had preceded the rupture, and careful measurements revealed the further fact that there was no reduction of area at the points of fracture. The appearance of the fractured faces showed no trace of fiber, and was altogether granular. Yet the longitudinal section, taken immediately through the break and developed by acid treatment, shows the presence of but few and small crystals, and the generally fibrous character of the iron used in the strap.

In the connecting-rod of the chain-cable testing machine we find the crystalline appearance of the fracture, if anything, less than that of the beam-strap—while the development of the longitudinal section by acid treatment reveals, in this case, most beautifully the thoroughly crystalline character of the metal. As is well known, this rod, after many years of service, finally broke under a comparatively light strain, and having all along been supposed to have been carefully made, and from well-selected scrap, its intensely crystalline structure, as revealed by the fractures, has done service for quite a number of years as piece de resistance in all the "cold-crystallization" arguments which have been served up in that time. A few words in regard to the true causes of the crystallization of that rod may therefore not be amiss right here.

Having, through the courtesy of Professor Thurston, been permitted to experiment with the pieces of broken rod which you see here, the first thing I did was to develop the longitudinal section by cutting the rod in that direction and treating it with acid. The purpose of this was to obtain primarily a classification of the crystals, and from the character of the crystal to judge of the conditions under which they must have been formed. As you see, some of the crystals are so large that they are discernible with the naked eye. This treated section furnishes incontrovertible evidence that the rod, aside from the fact of being badly dimensioned, anyhow, was made of poor material, badly heated and insufficiently hammered, all records, suppositions and asser-

* Read before the Society of Arts, Mass. Inst. Technology, Boston, April 12th, 1883.

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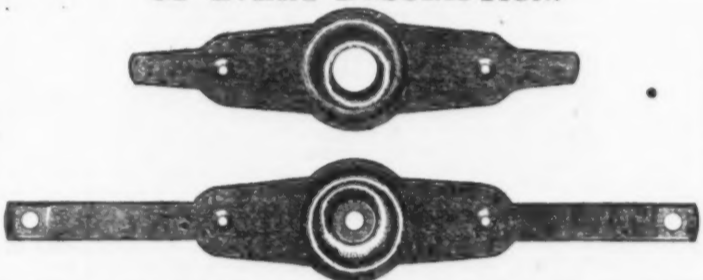
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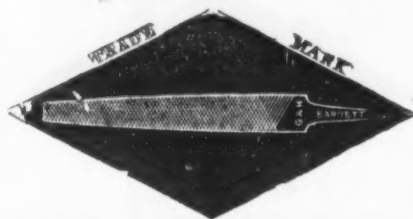
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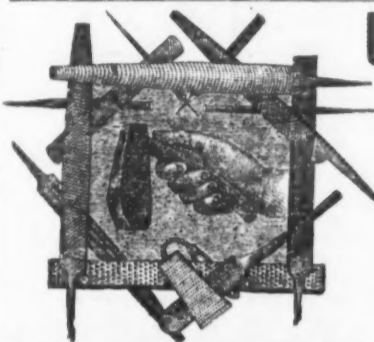
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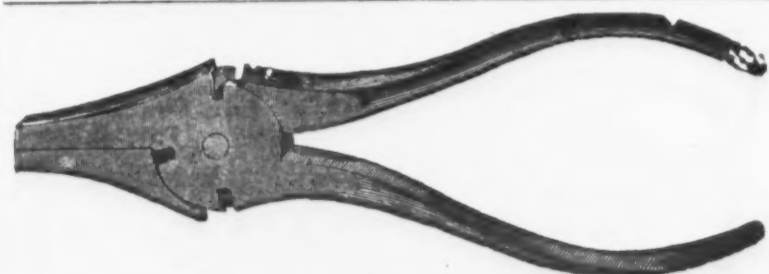
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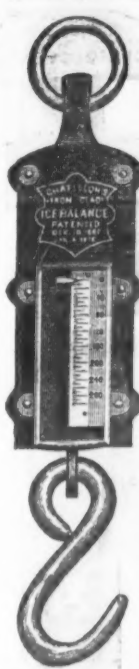
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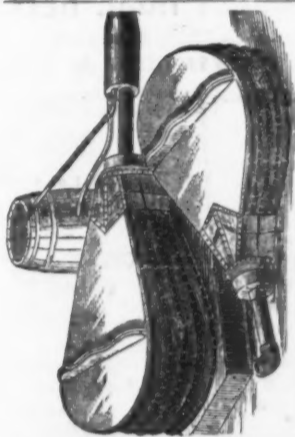


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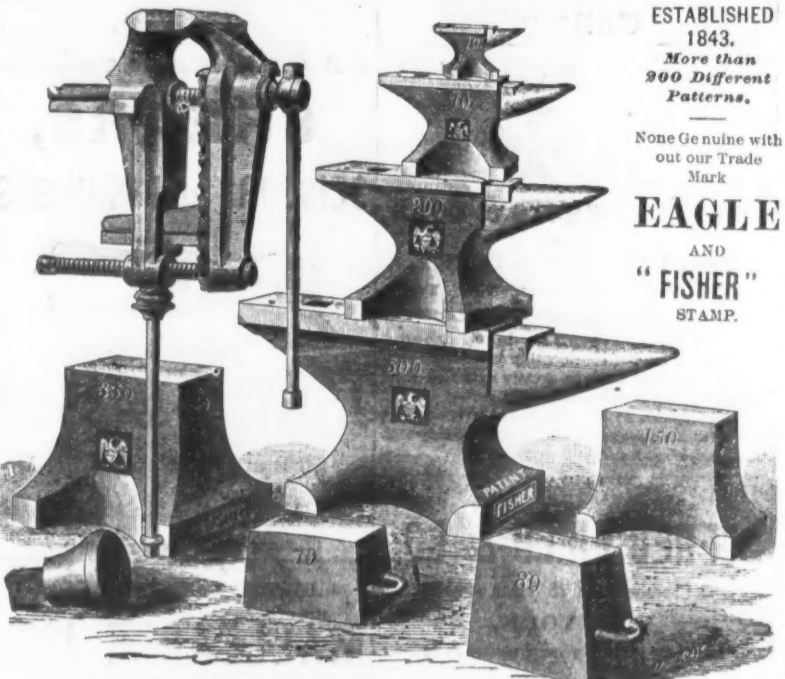
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tions to the contrary notwithstanding. If
 there is anything remarkable about this
 connecting-rod at all, it is not the fact that
 it broke, but that it did not break much
 sooner. Leaving out of consideration en-
 tirely the dimensions of the rod and the
 service it performed, and dropping all dis-
 cussion as to whether it was properly de-
 signed or not, let us see what sort of story
 the crystals tell in regard to the quality of
 the iron. For this purpose it is only neces-
 sary to point, by way of proof, to the pres-
 ence in large quantities of the class of
 crystals which are shown you here magnified
 125 times. These crystals are composed of
 a substance, presumably a ferro-carbide,
 which is not soluble in nitric acid, and is
 found in steel only. The deduction, there-
 fore, from the large amount of this substance
 shown in the sections of the rod, that the
 pile was not formed, as stated, from "best
 selected scrap," but, on the contrary, of
 rather poorly selected scrap, with steel scrap
 mixed in, is by no means a forced one.

The evidences of bad heating are also
 abundant throughout both the faces of the
 fracture and the section treated with acid.
 The peculiar granulation always observable in
 material exposed either to a sudden, sharp
 flame or long-continued heat are traceable in
 almost every part of the broken piece under
 consideration. With material thus over-
 heated, the effects of bad hammer-work are
 shown by the looseness of the fiber and the
 peculiar crystallization which characterizes
 contraction cavities thus formed.

When either iron or steel—especially steel
 which is overheated is put under the ham-
 mer, cavities commonly called "shakes"
 are formed. The walls of such cavities are
 usually found to be lined with large, well-
 defined crystals. In large forgings these
 crystals attain sometimes to 1/2 inch diameter
 in size, and between them are interspersed
 smaller ones. These crystals project occa-
 sionally as much as half their length into the
 cavity, the walls of which latter have a clear,
 unoxidized appearance, with a silvery luster.
 When rupture ensues in the direction of their
 axes, the prolongations of the large crystals
 are not always traceable in the section by
 the method of acid treatment mentioned, but
 the general appearance of the resulting gran-
 ulation in iron, as shown you here enlarged
 150 times, is invariably met with. These are
 particularly noticeable near the outer edges
 of the section, or, in other words, near the
 surface of the rod. Their origin is traceable
 mainly to the fact that the overheated pile
 or slab probably showed indications of going
 to pieces under the first blows of the hammer,
 and that the heated mass was therefore
 quickly turned, and by rapid and light blows
 put into its final shape.

But the strongest evidence against the
 presumption that these crystals were formed
 during the service of the rod, or while the
 metal was cold, is found in the various
 groupings of the crystals during their forma-
 tion, as shown in the tracery developed by
 the acid. They are not of the same chemical
 composition, the lighter parts containing
 much more carbon than the darker ones; it
 is therefore pretty evident that with the
 grouping of the crystals a segregation of like
 chemical compounds took place, and this, of
 course, would have been impossible in the
 solid state.

What, then, are the conditions under which
 crystallization in iron or steel can take place?
 Thus far no one has yet adduced a single fac-
 tending to show that there is a suspension of
 the general laws of crystallization in favor
 of iron or steel. The primary condition for
 crystallization to take place is freedom
 of molecular motion, and, therefore, as far
 as is known, crystallization takes place only
 from solution, fusion and sublimation.

The fact is that there is at present not a
 single well-authenticated instance of iron or
 steel ever having become crystallized from
 use under temperatures below 900° F. There
 is no doubt that both wrought iron or steel
 broken by shocks, or subject to shocks and
 vibrations before breaking, will show a frac-
 ture of crystalline appearance, but this is
 due entirely to the fact that these kinds of
 stresses do not permit the gradual bringing
 under stress of all the fibers, therefore
 seriously injure the continuity of the metal,
 and hence impart to the fracture the peculiar
 appearance which is called crystalline.
 Where genuine crystals are found in the
 fractures, these have been there before the
 iron or steel left the mill or the blacksmith's
 shop. In this respect the experiments of
 Chernoff, of the St. Petersburg Steel Works,
 are almost conclusive, and a short summa-
 rization of them in this place will be apropos.
 Let the line a b c represent an imaginary
 thermometric scale, of which a represents
 the metal at any of the ordinary atmospheric
 temperatures; the point a that of dark
 cherry-red; b red, but not sparkling; and c
 the melting point.

o ——— a ——— b ——— c
 The points a, b and c have no permanent
 place on the scale, but vary with the quality
 of the steel; the harder the steel the nearer
 these points move to c, and the softer the
 steel the further off, and, speaking generally,
 with varying rates. The limits of these
 movements are so narrow that only an expe-
 rienced eye can note them; and it should be
 added here that the colors named have refer-
 ence to medium and hard steels particularly,
 for in very soft steels the points a and b
 recede very far, until in wrought iron the
 point b corresponds to white heat. The defi-
 nition of these points Chernoff gives as fol-
 lows: No matter how quickly cooled, steel
 will not harden below the temperature a; on
 the contrary, it will get sensibly softer. The
 definition of b is that steel heated to a lower
 temperature than b will not change its struc-
 ture, whether cooled slowly or quickly. As
 soon as the temperature has reached the
 point b, the substance of steel passes quickly
 from the granular (or, speaking generally,
 crystalline) condition to the amorphous, wax-
 like structure, which it retains up to its
 melting point—that is, to the point c. In
 this condition the metal possesses the prop-
 erty of incompressibility, and at the same
 time has an analogy with respect to the per-
 manence of amorphism to an exceedingly
 concentrated solution of a strongly crystal-
 line salt.

temperature the piece will appear as if
 damp; the separate crystals forming the
 mass will seem to be sticking or clinging to
 each other, and actually become gradually
 fluid, and the mass forms a solution of the
 crystals of alum in their own water of crys-
 tallization. If the fluid is now allowed to
 cool very slowly and in perfect quiet, large
 well-shaped and well-developed crystals will
 be formed; but if, with the same gradual
 cooling, the liquid is kept in constant agita-
 tion, the crystals will come out very small.
 Allowed to cool quietly, but rapidly, the
 crystals will also be small; and, finally, the
 least favorable condition for crystallization
 is when the liquid cools rapidly and is at the
 same time violently agitated. The same
 changes take place in the structure of steel
 when heated above b. The higher the steel
 is heated the softer it becomes, and the
 slower the temperature is allowed to fall to
 the point b without disturbance of the mass,
 the greater liberty will the particles have to
 group themselves into crystals, &c. At tem-
 peratures lower than b, as has already been
 stated, the structure is not changed. Hence
 we have the following conditions of struc-
 tural changes dependent upon heat:

o to a, steel will not harden.
 a to b, no change of structure.
 b to c, rising, amorphous structure.
 c to b, falling, crystallization.
 What is said here of steel holds measur-
 ably good for iron, with the proper consid-
 eration of the variations due to the influence
 of heat under varying carbon percentages.
 It is therefore evident that, in order to in-
 crease the density of iron or steel—that is,
 to bring about a more energetic cohesion of
 the particles—this must be done at a tem-
 perature below b, where we are not opposed
 by the force of heat.

If a cast ingot of any given structure is
 heated not higher than the point b, then in
 its heated state it will retain its structure.
 If it was crystalline, then in a heated state
 it would be composed of the same crystals,
 which, however, would be considerably soft-
 ened. If a piece of steel be forged in this
 condition, then its crystals or grains, being
 driven against each other, will change their
 shape, becoming elongated in one direction
 and contracted in another, and the increase
 in density becomes so considerable that the
 specific gravity is increased, which is never
 the case in steels forged at a temperature
 higher than b.

We must therefore conclude that all crys-
 tallization is due to effects of temperature,
 and working at temperatures far above
 those which the material can ever attain in
 use as part of a structure.

To show the facility with which crys-
 tallization takes place at high temperatures,
 and the peculiar dangers with which large
 forgings and hammer-work in general are
 beset, I ask your permission to recite
 the results of an experiment made lately
 by myself for the purpose of this demon-
 stration: A slab hammered out of best
 selected scrap, such as is used for the man-
 ufacture of connecting-rods, was taken at
 random from a lot in stock. The slab,
 weighing about 200 pounds, was drawn out
 under the hammer into a 3 x 3 inch square
 bar under the following circumstances: For
 the first heat the whole slab was put in the
 furnace, carefully heated, and then one-half
 of it only worked under the hammer. At
 the second heating only the worked part
 went into the furnace, and, when properly
 reheated, was worked out still further;
 the 3 x 3 inch bar being finished on the
 third heat for one-half its length. The
 forging was then turned end for end, the
 unworked portion of it put into the furnace
 and exposed to a sharp flame, bringing it
 quickly to a running heat, and then keeping
 it for a while longer exposed to this high
 temperature. The result was that it showed
 signs of going to pieces under the first blows
 of the hammer. Moreover, the piece being ex-
 ceedingly soft, the reduction under full-force
 hammer-blows would have been too great. It
 was therefore only hammered very lightly,
 then reheated in the same injudicious manner
 as before, and finished on the second heat.
 After the bar was cooled it would have been
 impossible to detect any difference in the
 appearance of the two halves into which
 the forging was next divided. The next
 step taken was to slit a piece out of the
 center of each of these halves for their whole
 length, giving a test piece 1/2 inch thick, 3
 inches wide and about 3 feet long. Each
 one of these pieces was then further cut in
 two, one half to be broken in the testing
 machine under tensile strain, the other half
 to be ground and polished for treatment with
 acid. For the sake of comparison similar
 test pieces were cut from a rolled bar. The
 acid development of these sections is here
 before you. Comparing the two pieces of
 hammered iron, it would seem almost incred-
 ible that they were made not only from the
 same scrap pile, but were parts of the same
 bar. The one is a fair representative of the best
 quality of hammered iron, leaving, as far as
 the quality of the material goes, nothing to
 wish for. The noticeable distortion of the
 fiber is incident to all hammer work, and
 only by the best practice will it be found
 possible to produce work showing such con-
 tinuity of fiber as is found in this specimen.
 Average hammer work shows usually far
 greater distortion and considerable less con-
 tinuity of fiber.

In the other the results of injudicious
 heating and bad hammering are very thor-
 oughly demonstrated. The crystallization is
 very strongly marked, and the majority of
 the crystals are large and well developed.
 The abundance of crystals found in contrac-
 tion cavities and which were shown you be-
 fore enlarged 150 times (some of them in this
 case fully 0.1 inch in diameter), tells a plain
 story of maltreatment. Now, here is a piece
 of metal which was undoubtedly made from
 the best selected scrap, as fully proven by
 the appearance of the first half of the bar
 and its tensile strength; yet it would be diffi-
 cult to make it much worse by using the
 least desirable quality of scrap. True, the
 metal was purposely ruined, but the same
 result would have followed accidental over-
 heating, through carelessness or lack of skill
 or judgment on the part of a hammer-man.
 Either is almost unavoidable under the best
 shop discipline, especially under great pres-
 sure of orders.

Summing up what has thus far been said
 on the subject, we find that the crystalline
 appearance of a fracture may be due either

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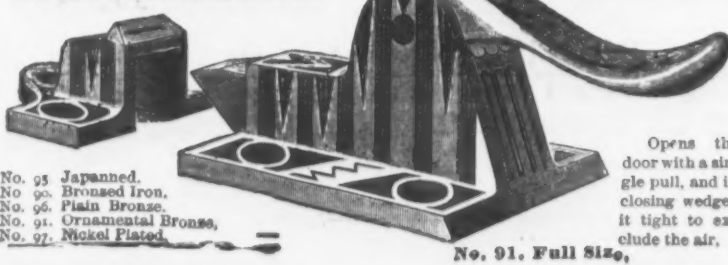
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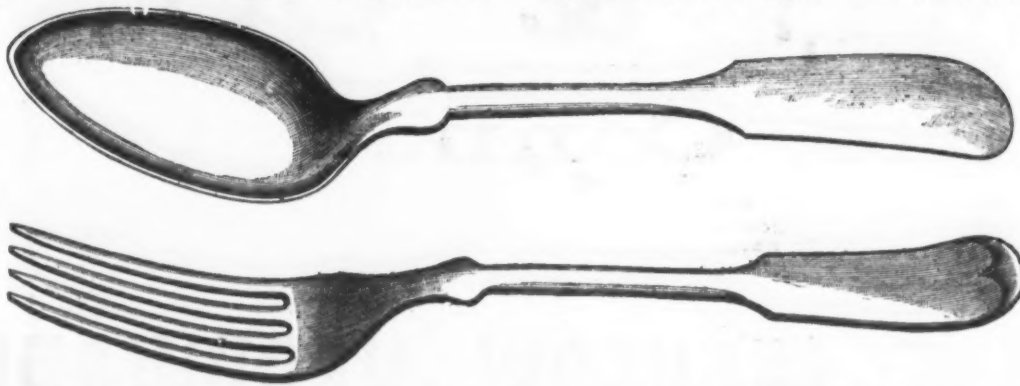
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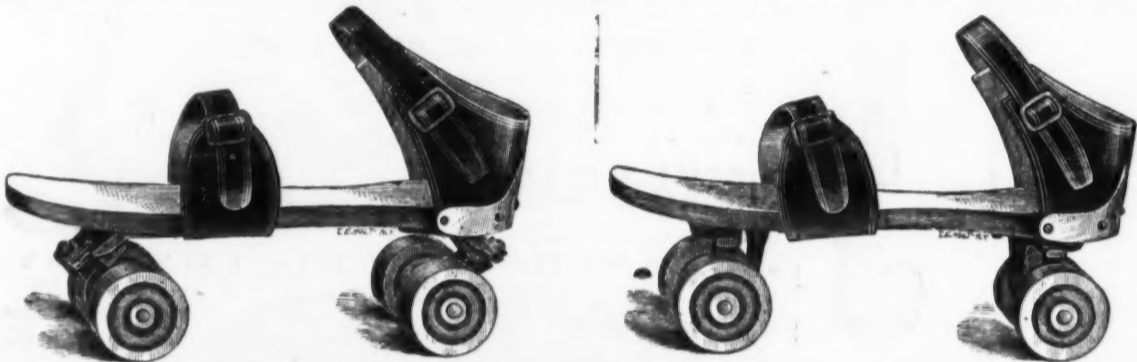
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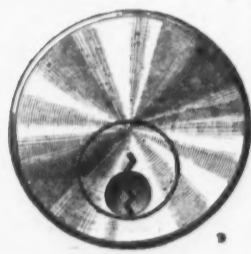
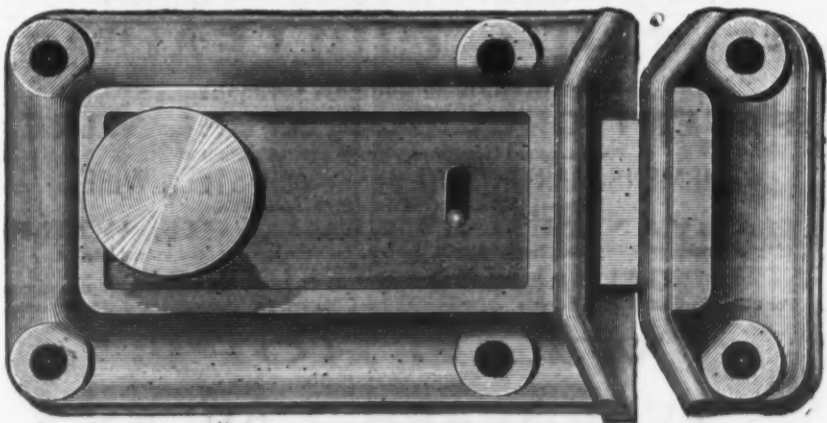
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to genuine crystallization having taken place in consequence of insufficient or defective working in the finishing processes, or it may be due to that peculiar mode of rupture which is brought about by vibratory strains or severe shocks. No method of dimensioning will ever be found adequate to compensate rationally for defective workmanship. True, the factor of safety is supposed to include the compensation for defective workmanship, but practice teaches us that it does not. The fact is, all hammered iron or steel is more or less crystalline—the lesser or greater degree of crystallization depending altogether upon the greater or lesser skill employed in working the metal, and also largely upon the size of the forging. Crystallization tends to lower very sensibly the elastic limit of iron and steel, and therefore hastens the deterioration of the material under strain. It is for this reason that large and heavy forgings ought to be, and measurably are, excluded as much as possible from permanent structures. In machine construction we cannot do without them, and must therefore accept the necessity of replacing more or less frequently the parts doing the heaviest work. Whether we shall ultimately succeed in formulating precisely the effects of vibratory strains is a question which only time and careful and extended experiments can solve.

That our present methods of dimensioning and our conventional safety coefficients are lamentably defective every intelligent engineer knows, and chafes under the restraint they impose upon his designs, especially in competitive work. Yet so long as we adhere to the absurdity of basing the factor of safety upon an erroneous and meaningless ultimate strength, we must be prepared to meet with "unaccountable" failures. It is the proud claim of modern science that in the solution of engineering problems the use of the word "impossible" has become obsolete. This claim will be considerably strengthened when scientific research once succeeds in dissipating the mists of superstitious tradition which envelop at present the records of so-called "unaccountable" failures, and among which cold crystallization plays such a prominent part.

LATEST LEGAL DECISIONS.

PARTNER'S INDIVIDUAL INDEBTEDNESS NOT PAYABLE OUT OF FIRM'S ASSETS.

R had his note for \$1200 discounted, and paid \$780 into his firm as a portion of his contribution to the capital. When the note fell due it was renewed, and afterward R gave a judgment note of his firm for the amount. A creditor of the firm attacked the judgment as not binding on the firm, and therefore fraudulent as to creditors. In this case—McNaughton's appeal—the Supreme Court of Pennsylvania decided in favor of the creditors. Judge Sterrett, in the opinion, said: "1. One of the general incidents of a partnership is the right of each partner to apply the firm assets to the payment of its liability, and, following out that principle, it has been held that one of several partners may justly subject the joint property to levy and sale in discharge of partnership indebtedness by giving a judgment note therefor in the name of the firm. But it is a very different thing in a legal as well as moral point of view for a partner to thus undertake to pay his individual debt without the knowledge of his partner. 2. This judgment between R and his creditor was collusive, and not binding on the partnership. Whenever such a judgment or the execution issued thereon thus comes into conflict with the claims of creditors, they may avoid its effect by showing that as to them it is a nullity."

PURCHASER OF PROPERTY ASSUMING MORTGAGE DEBT.

W bought a half-interest in a house on which there was a mortgage, and the amount of the mortgage debt was allowed in the price, and he agreed in the transaction to be jointly liable with the vendor for the mortgage debt. The mortgagees sued W for the debt and was defeated. He appealed the case to the Supreme Court of Appeals of Virginia, which reversed the decree. Judge Staples, in the opinion, said: "After much discussion, and notwithstanding some diversity of judicial opinion, the rule seems to be now settled that a grantee of mortgaged premises, who has purchased subject to a mortgage for which his grantor was primarily liable, and has assumed the payment of the mortgage debt as a part of the consideration, is personally liable to the mortgagee in a suit to foreclose the mortgage. The amount allowed to the grantee out of the purchase money, by reason of his assumption of the mortgage, is a fund in the hands of the grantee applicable to the payment of the mortgage, in exoneration of the grantor. As between the grantor and the grantee, the latter is the principal debtor and the grantor is the surety; and the creditor or mortgagee, being entitled on equitable principles to the benefit of all collateral security held by his debtor, may resort, by way of equitable subrogation, to the covenant of the purchaser or grantee with the mortgagee."

INTEREST ON INTEREST—CONSIDERATION—FORBEARANCE.

On June 1, 1866, W borrowed from E \$1240 at 10 per cent. interest, payable yearly. The first payment made on this debt, or the interest on it, was on March 10, 1876. During the year of 1876 W paid E \$3500, and refused to pay more. E then sued him for the balance he claimed, which was computed by charging interest at the same rate of 10 per cent. on the installments of interest as they fell due. In this case—Edgerton vs. Weaver—the Supreme Court of Illinois decided in favor of the defendant. Judge Scholfield, in the opinion, said: "It was incumbent on the plaintiff to show that the promise to pay interest on interest was supported by a consideration deemed valuable in law, and an acceptance of such promise, either actual or constructive. The consideration here claimed was the forbearance of E in collecting the debt and interest, and it is clear it is a question of fact whether there was such a promise, or what consideration, and whether or not it was accepted. It has been decided that a promise to pay the debt of another, based upon forbearance as a consideration, is not binding unless it is proven

that the promise was made for the purpose of obtaining time; that the time was actually given, and especially that the indulgence thus accorded was in pursuance of the request implied by the promise. The question is one of fact, which cannot be found affirmatively in the absence of proof. And so, obviously, whether actual forbearance, following a promise to pay interest for forbearance, is evidence of an acceptance of the promise, is a question of fact. Here the evidence was that the defendant asked the plaintiff to wait, and that he did wait—nothing more. This does not show that the plaintiff accepted the request of the defendant; he might have enforced his demand at any time, and the defendant have had no relief; no contract for forbearance could be shown by him. Therefore, he was not bound, the plaintiff not being bound."

PEDDLING PATENTED ARTICLE—LICENSE.

A city ordinance required peddlers to take out a license of \$15 a year, or they would be compelled to pay \$3 a day. R was selling a patented clothes-wringer and when he was arrested he set up as a defense that as the letters patent authorized the manufacturers to make, use and vend the patented article, no State or portion thereof could restrict the sale. He was convicted and fined, and appealed the case—The People vs. Russell—to the Supreme Court of Michigan, which affirmed the judgment. Judge Cooley, in the opinion, said: "The power of Congress to grant the exclusive right to make and sell the articles, which from their originality and value have been found deserving, is exclusive, and any State legislation which undertakes to limit or restrict in any manner the privilege which the letters patent confer is an invasion of the sphere of national authority, and therefore void. But this ordinance does not assume to interfere with or in any way to abridge the exclusive rights of the patentee. The ordinance is a police regulation, made under the general police authority, of the State, taking no notice of this or of any other patent, or of the way in which any saleable commodity may have come into existence. It is one of the customary regulations for a business. It is well settled now, if it was ever doubted, that any ordinary exercise of Congressional authority does not take away from the State any portion of its general power of police."

Piracy of Metal Brands.

A recent issue of the *Ironmonger* furnishes particulars of a series of alleged frauds in Swedish iron, said to have been committed in London a few weeks since and incidentally referred to by our London correspondent in a recent communication. The matter naturally excited considerable interest in metal circles. According to the account given by our contemporary above mentioned, it appears that some months ago a certain firm of London merchants who are in the habit of shipping to the East received an offer from a local firm of metal brokers to supply Swedish hammered bars at a price something below the market value of that class of iron at the time considered. After preliminary negotiations it was decided to purchase, the understanding on the part of the buyers being that the iron to be supplied was really Swedish—that is to say, manufactured in Sweden in the usual manner. No question was raised as to the genuine character of the iron, simply because there was then no suspicion of fraud or duplicity. A number of contract notes were received by the purchasing firm for various quantities of iron, in none of which, however, was there any mention of "imitation Swedish," or, in fact, anything to show the buyers that they were being supplied with iron which was not what it professed to be. An invoice received by them some time later was the means of bringing to light the whole matter. The invoice contained the words "bars cut slant," which aroused the suspicions of a gentleman in the employment of the firm, knowing, as he did, that in real Swedish hammered bars that would follow as a matter of course, and therefore need not be distinctly mentioned. In order to allay these suspicious inquiries were made, and it was found that the iron had actually arrived from Middlesborough. Experts who were detailed to inspect the material reported it to consist chiefly of short pieces, with round stamp similar to the brands on Swedish iron. The surface and appearance of the bars, however, were stated to be unlike those generally observed in Swedish hammered iron, and the opinion was expressed that the iron was rolled. Under these circumstances the buyers naturally repudiated the contracts made, and relieved themselves of any liability in the matter.

The rumor of what had thus happened naturally obtained currency, and its circulation led to the detection of at least one other instance in which the "Swedish iron," bought originally from the same vendors and bearing the same brand, had passed through two or three hands and had actually been shipped abroad. In one such case the shippers are understood to have issued a writ against the firm from whom they bought, the latter firm having their remedy against the original vendor. The iron was inspected and tested, and was shown to be quite unequal to breaking, bending and other tests which real Swedish iron will easily withstand. Its fracture also was very different from that of Swedish bars, and, further, its appearance was wholly against it, the "skin" being rough and broken, and the edges different from those of iron manufactured entirely under the hammer. The question of its composition appears to be settled by an offer of the makers to supply "imitation Swedish bars" at a certain price, to be composed of "70 per cent. Swedish pig and 30 per cent. English hematite," or "50 per cent. Swedish pig, 25 per cent. hematite and 25 per cent. Middlesborough pig," it being honestly stated that the iron was not made with charcoal, and that, of course, it was the firm's Swedish iron. This, continues the *Ironmonger*, would appear to settle the respective liabilities of the makers and the vendors first alluded to herein, the makers' statement being that there could be no question of the iron being real Swedish, when it was known to be made by themselves at their own works. With this point, however, it is not within our province to

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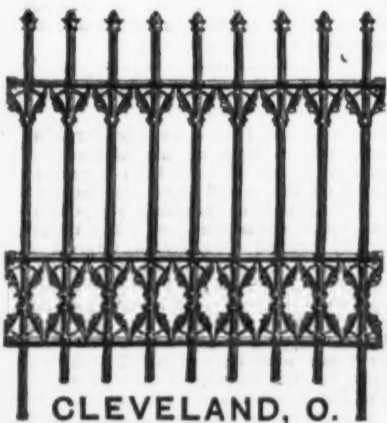
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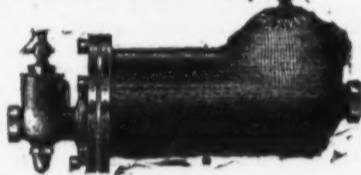
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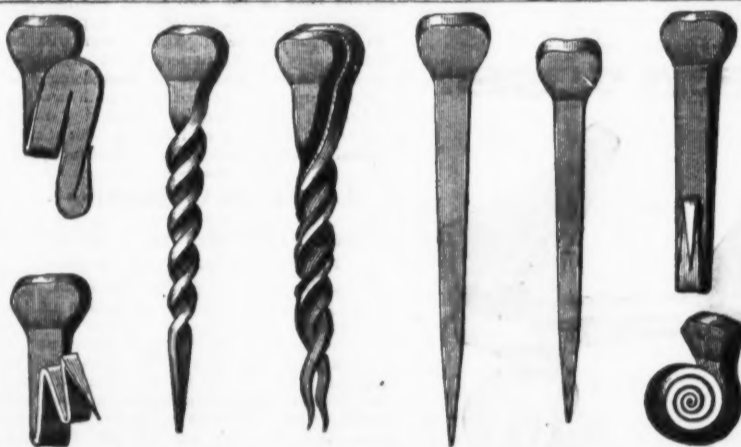
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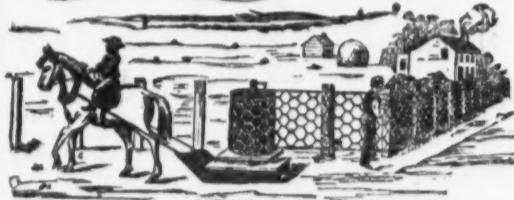
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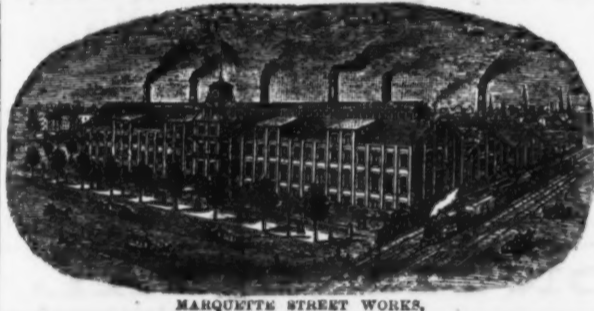
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Condition of the Blast Furnaces of the United States, April 1, 1883.

Our regular quarterly report of the condition of the blast furnaces of the country will be found on the next page. In view of the condition of the blast-furnace industry and the doubt and uncertainty that have hung over its future, largely by reason of the price of ore, this report is especially interesting. In order to avoid any misunderstanding and to point out exactly the scope of the table, the following explanations are given:

1. The divisions of the localities are geographical for the most part, and are not made with reference to the points from which furnace supplies are drawn. 2. The columns "in blast" and "out of blast" only show the stacks from which we have reports, and their footings will not in every case equal the footings of the column of total number. 3. We have included some furnaces that are rebuilding and not yet completed, and others that are building, and in one or two cases some furnaces that have been reported abandoned, since their owners do not report them. In this connection, however, we have availed ourselves of the new edition of Mr. James M. Swank's valuable "Directory to the Iron Works of the United States," and think that our lists now contain very few furnaces that are not likely ever to go again in blast. For this reason also there will be more or less discrepancy between this and our report of last January. 4. The column of capacity per week is somewhat in excess of what the regular working of the furnace will show—stoppages, slow working and various other causes, which will readily occur to those interested, combining to reduce the make below the furnace capacity.

In a condensed form the table shows the following (I, in blast; II, out of blast):

CONDITION OF FURNACES APRIL 1, 1883.	
	II.
Charcoal.....	98
Anthracite.....	136
Bituminous.....	121
Total.....	355

As compared with January 1 of the present year, this is a very decided reduction, the condition at that time being as follows:

CONDITION OF BLAST FURNACES JAN. 1, 1883.	
	II.
Charcoal.....	151
Anthracite.....	166
Bituminous.....	88
Total.....	405

From this it will be seen that the decrease in the number of charcoal furnaces in blast since January 1 is 25, the decrease in the number of anthracite furnaces is 13, and of bituminous furnaces 17. The great change in the number of charcoal furnaces out of blast is due no doubt to the large stocks on hand by reason of the large overproduction in iron of this kind—a production that has led to very serious consideration of the advisability of blowing out a large number of these furnaces for several months, in order to bring about such relations between supply and demand as will enable the charcoal furnacemen to get a reasonable price for their product. The smallest change has been in the anthracite furnaces, the number that have gone out of blast since the last report being less in this branch of the pig-iron industry than in any other, while the number of furnaces in blast is greater, both absolutely and relatively, than in either charcoal or bituminous. As compared with a year ago, the change is still more marked than compared with three months ago. A year ago 132 charcoal furnaces were in blast against 98 now, 175 anthracite against 136, and 150 bituminous against 121.

The relative condition of the blast furnaces of the country on the 1st of April for six years is as follows:

NUMBER OF FURNACES IN BLAST, APRIL 1.	
	1877. 1878. 1879. 1880. 1881. 1882. 1883.
Charcoal.....	57 60 68 108 130 133 98
Anthracite.....	82 97 89 186 159 175 156
Bituminous.....	79 95 84 149 155 150 121
Total.....	318 352 441 433 439 458 375

NUMBER OF FURNACES OUT OF BLAST, APRIL 1.	
	1877. 1878. 1879. 1880. 1881. 1882. 1883.
Charcoal.....	207 191 154 132 116 107 151
Anthracite.....	120 120 137 40 80 61 76
Bituminous.....	122 115 66 64 74 103
Total.....	449 426 350 276 251 314

Labor Situation West.

The committees representing the Iron Manufacturers' Association of the West and the Amalgamated Association of Iron and Steel Workers met in Pittsburgh on Saturday afternoon last to present their views to each other regarding the scale of wages for the year ending June 1, 1883. As to what occurred at this meeting both sides are unusually reticent. They have refused to make public the names of the conferees, what they did, what the probabilities are, and when future meetings will be held. They have delegated the secretaries of the two associations, Mr. Martin and Mr. Weeks, to make all statements that are to be given to the public, and all that these gentlemen will say is that the meeting was held, both sides presented their views, and without coming to any definite conclusion an adjournment was had to a future undetermined date. This course of the two associations certainly indicates that a conclusion will be reached without serious trouble. It shows a determination on their part to discuss the question among themselves and settle it without calling in the aid of the public, and the action of these two associations last year certainly indicates that they are fully competent to do it.

But while there seems to have been a re-

fusal to state what the action of the conference was, it seems evident, from hints that are dropped, that the manufacturers proposed a reduction of the scale, which the workmen refused to accept, the employees demanding the continuation of the present scale, with some slight modifications. It is stated that a scale fixing a rate of wages to be paid engineers in the mills, which has been agitated and discussed for something like 18 months, was proposed, and some additions were made to the puddling and finishing scales by the men—not changing them as to prices and terms, but simply recognizing in the scale certain rates that are paid for certain classes of work which have not heretofore been included in the yearly scale agreement. It is, of course, too early to form even an idea of what the result will be, even if we had the information as to what took place at this meeting. While the Pittsburgh manufacturers and those of the West will not state what their demands were, they do freely say that they must have a reduction in wages; that there is no reason why from \$1.50 to \$2 a ton more for puddling should be paid in the West than in the East. They also can see no reason why, if the Amalgamated Association have conceded a reduction of 33 1/2 per cent. to the Bessemer steel mills of the West, whose product comes into competition so largely with their own, they also should not have a corresponding reduction. The men ought to be wise enough to see that the claim of the manufacturers is a just one. We do not believe that they will be so unwise as to permit a lockout, and see work that should be theirs go East to workmen who will not assist them in keeping up prices, but who will accept reductions and at the same time appeal frantically to the Western men not to accept them, because if they do it will make still another reduction East. In a word, from the tone of the Pittsburgh papers, we are convinced that both manufacturers and workmen will refuse to give the East the nice plum that they had last year, and permit them to run day and night to supply the Western trade; but, at the same time, we are of the opinion that, unless a reduction is conceded, there will be a general lockout of the Western mills.

The Manufactured Iron Trade of Great Britain in 1882.

The detailed statements as to the manufactured iron trade of Great Britain in 1882, which have just come to hand, are interesting and suggestive in many respects. A prominent feature of the report is a number of tables giving the production of puddled bar in the principal districts of the Kingdom, the average annual production per puddling furnace, the output of different descriptions of manufactured iron, and numerous other particulars of equal interest and importance. Inspection shows that the total production of puddled bar during the year amounted to 2,841,534 tons, the Cleveland district heading the list with 852,199 tons. Comparing these figures with those of the preceding year, we find an increase of 160,384 and 183,070 tons respectively, the latter, however, being subject to the modification that the value for 1881 referred to manufactured iron only, while that for 1882 applies to puddled bar. As the quantity of the latter produced in 1882 was more than 100,000 tons in excess of the make of finished iron, a nearly corresponding increase of puddled bar may be assumed for the former year.

The official returns of the production of manufactured iron in the North of England, issued by the Board of Arbitration, for the year 1882 are as follows:

Year.	Rails.	Plates.	Bars.	Angles.	Total.
1873.....	290,074	177,847	75,153	58,167	610,251
1874.....	344,440	195,522	70,426	44,403	654,821
1875.....	295,009	178,273	61,059	40,500	574,841
1876.....	246,218	173,416	101,041	41,249	561,924
1877.....	207,832	179,374	88,303	56,674	531,173
1878.....	265,500	214,723	77,131	67,035	564,389
1879.....	216,645	213,662	78,281	87,649	596,237
1880.....	276,788	217,607	62,848	48,801	606,044
1881.....	274,414	216,790	71,337	62,807	625,348
1882.....	350,924	304,458	70,459	102,557	828,408
Totals.....	5,669,135	4,352,216	1,625,569	1,046,647	12,693,567

In compiling this table, however, the output of eleven firms was not included, and as these are estimated to have produced about 110,000 tons, the total manufacture of finished iron is brought up to 741,043 tons. The actual production of puddled bar during 1882 in this portion of the Kingdom was 35 per cent. more than the production of the four leading varieties of manufactured iron already specified. The production in South Wales, however, showed a marked decline, attributed to the fact that two of the large works there ceased to manufacture wrought iron in 1881, having taken up the manufacture of steel instead. Owing to this movement some 149 puddling furnaces were thrown out of use. A third establishment was entirely dismantled last year, and only twelve Welsh works are now engaged in turning out puddled bar, against thirty a few years ago. The total number of active puddling furnaces in the whole Kingdom at the end of 1882 was 4369, being 814 less than in the preceding year, and the average annual production per furnace was 650 tons. It should be remembered, however, that the number of furnaces in operation for the whole year probably varied to a great extent in every district, and the number working on December 31 cannot, therefore, be safely adopted as a fair average. In some cases, also, large quantities of scrap were worked up, and the products of ball furnaces were included with puddled bars, thus accounting, in a great measure, for the high averages given for several districts.

Reviewing the figures for some years past, it appears that the decline in the total num-

ber of puddling furnaces has been considerable. Thus, in 1860 the total number was 3462; in 1864, 6338; in 1868, 5903; and in 1872, 7311. The latter was the greatest number returned in any one year. In 1874 the number had declined to 6803, and in 1877 it rose again to 7159. The total number of furnaces returned for 1882 (6296) was not less than that for the preceding year. The number of furnaces in actual operation at the end of 1882 was, as already remarked, 814 less than that returned for the corresponding date in 1881, but of these a good many had probably been working over a certain part of the year. This is, indeed, made tolerably evident by the greater production of 1882. Assuming that 10 per cent. of the furnaces constructed are usually out of work for purposes of repair, &c.—which is the calculation generally accepted by the trade—it would appear that of the remainder, 21 per cent. of the furnaces were inoperative on account of the condition of trade, and of that proportion probably two-thirds will not again be lighted up. The statistics of furnaces for 1882 show that out of the total number (6296), 4369 were in operation, while 1927 were idle, the percentage of total in activity, therefore, being 69.39.

So far as the production of different descriptions of manufactured iron is concerned, the following table, compiled by the British Iron Trade Association, may prove of interest:

Descriptions.	Production, tons.	Percentage of total production.
Ship plates.....	495,000	30.53
Angles.....	260,000	16.49
Bars.....	414,000	25.78
Rails.....	60,339	3.79
Sheets.....	114,200	7.04
Hoops.....	71,000	4.38
Wire rods.....	81,000	4.99
Coke bars (for tin plates).....	15,000	0.93
Strips.....	42,000	2.60
Tees.....	21,730	1.33
Packing iron.....	3,500	.21
Fencing wire.....	10,800	.66
Nail rods.....	18,600	1.14
Boiler and other plates.....	64,000	3.94
Total.....	1,620,959	100.00

In this case, however, it may also be remarked that the figures cannot be implicitly relied upon, many firms dividing their returns simply into "puddled bars" and "finished iron," without more definite particulars. On the whole, however, the returns may be accepted as indicating to some extent the proportions of the different leading productions from puddled bar.

The production of ship plates was considerably larger in 1882 than in any former year, the increase in the North of England alone being 47,500 tons. It should be noted that this district produces more than three-fourths of all the iron ship plates manufactured in the country, and it was calculated, on data supplied by a leading shipbuilder on the Clyde, that in the shipbuilding trade of the United Kingdom 650,380 tons of plate, angles and bulbs would be employed during 1882, and of this quantity the North of England would produce about 580,000 tons, of which, however, a certain proportion would be exported to foreign countries.

Iron-rail statistics show that in 1882 the number of works engaged in turning out this description of finished iron amounted to fourteen, with a production of 60,339. The quantity exported during the year is stated to have been 46,532 tons, so that a remainder of some 13,807 tons must have been used for home purposes, and the greater proportion of this quantity is estimated to have taken the form of light rails for collieries. The Board of Arbitration returns for the production of manufactured iron in the North of England during the past eleven years are as follows:

Year.	Rails.	Plates.	Bars.	Angles.	Total.
1873.....	290,074	177,847	75,153	58,167	610,251
1874.....	344,440	195,522	70,426	44,403	654,821
1875.....	295,009	178,273	61,059	40,500	574,841
1876.....	246,218	173,416	101,041	41,249	561,924
1877.....	207,832	179,374	88,303	56,674	531,173
1878.....	265,500	214,723	77,131	67,035	564,389
1879.....	216,645	213,662	78,281	87,649	596,237
1880.....	276,788	217,607	62,848	48,801	606,044
1881.....	274,414	216,790	71,337	62,807	625,348
1882.....	350,924	304,458	70,459	102,557	828,408

Inspecting these figures, it will be noticed that there was a steady decrease in the tonnage from year to year, the minimum being reached in 1879, after which, however, the output rapidly rose from a total of somewhat less than 300,000 tons to more than double that quantity. The decrease referred to extended through almost every department, being most strongly marked in connection with rails.

The exports of finished iron for 1881 and 1882, including tin plates, were as follows:

Description.	1881.	1882.	Increase or dec. in 1882.
Bar, angle, bolt and rod iron.....	204,757	313,645	+18,888
Wire.....	75,118	80,685	+11,504
Hoops, sheets and plates.....	395,499	341,987	-17,788
Tin plates.....	244,448	205,021	-24,573
Other iron.....	901,934	370,100	-77,455
Iron rails.....	119,086	45,318	-71,554
Other railroad iron.....	106,506	152,672	+46,166
Totals.....	1,436,088	1,537,842	+101,754

Referring to the exports of wire, we would state that both iron and steel wire are included, the two not being separated in the Board of Trade returns. "Other railroad iron" implies the remainder obtained after deducting iron and steel rails from railroad iron of all sorts in the returns, and is likely to include a certain undetermined proportion of steel sleepers, &c. Altogether, it will be noted there was an increase in every instance but one, the figures indicating an encouraging outlook for the present year.

The Census Statistics on Coke.

The report of the Special Agent on coke manufacture seems to have greatly disturbed the equanimity of a journal published in the Connellsville region, and, as usual in attacks on the census, without stopping to investigate the facts of the case, it immediately charges the report with containing gross errors. The particular error in this case seems to be that the census agent reported the number of persons employed in the manufacture of coke in Pennsylvania at the close of the census year as 2444, whereas the paper in question claims that there were engaged in the coke industry in the Connellsville region alone over 6000 people, arriving at his estimate of 6000 by assuming that there were 6000 coke ovens in this region at that time, and that one man to an oven was employed. This number of 6000 is found by including with those engaged in the manufacture of coke all the persons engaged in the Connellsville region in mining coal for that manufacture. The Special Agent replies to this method of confounding industries as follows:

May I suggest that the error, if any, is not in my report, but in the failure on your part to clearly distinguish between the manufacture of coke and the mining of coal for that manufacture. My report only aims to cover the statistics of the manufacture of coke, and in such manufacture coal is clearly a raw material, should be so classed, and is so reported. It would be no more correct to report the men employed in mining coal for use in coke-making as engaged in the manufacture of coke, than it would be to report the men employed in mining iron ore or quarrying limestone, or even in burning coke, as engaged in the manufacture of pig iron. There is a very clearly marked distinction between the two industries, mining coal belonging to one of the six great divisions of occupation—mining—while coke-making is a manufacture of coal, and belongs to another class of occupation—manufacturing.

The trouble with the journal in question seems to be that it is anxious to increase the importance of the coke industry; in fact, this has seemed to be the trouble in all the attacks that have been made on the census.

The census officers, as we understand their method of work, propose to give the statistics of certain industries. In scores of these industries, what is the product of one is the raw material of the other, and it is the design of the census to make clearly marked distinctions between these different industries. The census tables, as well as the general practice of persons accustomed to statistics of manufacturing industries, classify these industries into six great divisions—agriculture, personal and professional services, trade and transportation, manufacturing, mechanical, and mining. This is reasonable and proper classification, and unless each industry is kept within proper bounds, and unless those statistics included under that industry properly belong to it, the utmost confusion would result. For example, as the Special Agent states, the mining of iron ore is as much a part of the manufacture of pig iron as the mining of coal is a part of the manufacture of coke, but it would be evidently absurd to say that the statistics of the mining in either case should be included under the manufacture of the mined article, and yet this is precisely what the editor of the paper referred to above desired to have done; indeed, he shows this to be his desire in the closing paragraph of an editorial, in which he says: "To express the whole matter in a few words, the report of Agent 'Weeks magnifies the coal trade at the expense of the coke trade.' In other words, the paper in question desired to have the coke trade magnified at the expense of the coal trade, while the object of the census was to give to each what belonged to it."

Our Foreign Trade in Spelter.

As spelter is about the only metal which has stood its ground tolerably well during the weak state of affairs prevailing since the beginning of the year, it is more than likely that importation of it may recommence after a while on a larger scale, should the price advance sufficiently to leave a margin for it, however trifling. It will be well to see, therefore, from the statistics of the past seven years the position of this metal in our market, and the probable effect of a large importation at this time.

DOMESTIC EXPORT.				
Calendar Year.	Zinc ore.	Spelter.	Totals.	
	Cwts.	Value.	Pounds.	Value.
1876.....	6,698	\$39,151	791,240	\$65,505
1877.....	12,255	77,391	2,001,035	166,551
1878.....	14,660	69,137	3,097,823	255,104
1879.....	14,048	46,560	1,236,140	100,787
1880.....	5,519	10,368	1,727,771	154,817
1881.....	19,090	10,417	1,438,843	116,611
1882.....	3,817	14,477	1,159,244	98,008
Total.....	76,417	\$275,532	11,336,880	\$954,803

During the seven years we imported 44,340,116 pounds of spelter and 18,367,844.

pounds of sheet zinc; together, 62,707,960; and re-exported during the same time, 154,340 pounds of sheet zinc, leaving 62,553,621 pounds net, or 27,926 tons. Deducting from this amount 11,336,880 pounds, or 5061 tons, of domestic spelter, which we exported, it appears that there were retained altogether 22,865 tons, or an average of 3266 tons per annum.

Since the development of our Western spelter mining, smelting and zinc manufacturing industry, the importation of both spelter and zinc has, it will be seen, become quite restricted, if we except last year, and there must be some special inducement, such as a supposed insufficiency of domestic production, to again stimulate the import to anything like what it was in 1882. If all the uses to which spelter and sheet zinc are put are active, including the galvanizing of barbed fence wire, it may easily be that we shall not produce enough at home, and the import, at least of spelter in slabs, may then be vigorously resumed without detriment to our market. But at best the importation is not without risk, for the moment the market is overshot, and too much piled upon the American market, months of dullness and decline ensue, for the metal does not recover easily after depression. In view of these facts, the metal is watched by importers with considerable interest. Spelter is at present at a moderate figure, and the experience of 1882, which we believe was encouraging to importers, is likely to inspire confidence, especially as its statistical position here is favorable.

Arbitration in the Western Coal Trade.

Another attempt to substitute arbitration for strikes in a portion of the coal mines of Western Pennsylvania has resulted, as did the previous one, in an utter failure. It will be remembered that about the 1st of October, 1879, a board of arbitration was formed in connection with mining coal in the railroad pits in the vicinity of Pittsburgh, which, after an existence of about three months and several unsuccessful attempts to make a scale for mining coal in these pits, gave up the attempt in utter despair. This second attempt at arbitration in connection with this same industry has also ended in failure, though there is a slight hope that another effort, and possibly a successful one, may be made to fix the price of mining without a strike. This last attempt originated with the miners some months since, and the formation of the board grew out of a request of the new officers of the Miners' Association for a consultation with the operators looking towards arbitration. Committees representing both sides were appointed, but on meeting it was found that the miners' representatives were not endowed with full power to act, and the operators refused to proceed until they were. This caused some delay until such authority could be secured from the workmen. Last week the final meeting of the board was held. The miners proposed a scale for digging, per 100 bushels, as follows:

On the wall.	Mining.
\$6.00	\$3.40
6.25	3.55
6.50	3.70
6.75	3.85
7.00	4.00

The scale presented by the operators was:

On the wall.	Mining.
\$5.75	\$3.00
6.00	3.10
6.25	3.20
6.50	3.40
6.75	3.50
7.00	3.75
7.25	3.85
7.50	4.00
7.75	4.15
8.00	4.25

Both of these scales were rejected by a tie vote, all the miners voting for their scale and the operators against it—and all the operators voting for the scale they presented and the miners against it. After the failure to adopt these scales an attempt was made to fix the price for a given length of time without a scale, but this failed also, and the board adjourned *sine die*. Since the adjournment, however, the secretary of the Miners' Association has written to the Operators' Association, suggesting that if they will furnish the data to prove that the rate for mining ought to be what the operators demand, the miners will be willing to accept it. What the result will be cannot be easily foreseen.

It is certainly to be regretted that this new attempt at arbitration has failed. Both sides, so far as the arbitrations were concerned, seem to have approached the discussion of the question in a spirit of fairness and a desire to reach a conclusion that should avoid a strike. The miners' officers certainly seem to have done everything in their power to make the arbitration successful, and, even when it failed, have shown a determination not to abandon the attempt so long as there is the least hope left. Just what has been the cause of the failure it is extremely difficult to say. Probably a number of causes have contributed to it. The probability is that the miners at large may not have been as thoroughly posted on the state of the market as would have been advisable. Their knowledge of the price of coal is largely made up from what they have to pay for it at retail, and when they are told that coal is selling at wholesale at from 6 to 7 cents while they have to pay from 9 to 11 cents for it, they are very much averse to believing the statement of the operators. There is no doubt, however, that one chief element in the failure of arbitration is a lack of confidence in one another among the miners. Until the miners or any other body

of workmen are willing to put their case into the hands of their representatives, and then trust those representatives to do for them the best that the circumstances will permit, and loyally uphold them in what they do, there can be no method of settling disputes about wages except by strikes. Certainly if they will not believe one another and trust one another, they will still less believe and trust the operators, and until there is confidence in the integrity of their representatives and the good will of the operators there can be no successful arbitration.

It must be conceded that in all attempts to fix wages, especially when a sliding scale is proposed, the basis of that sliding scale must be the selling price of the article, with some consideration of the relation of the cost of production to this selling price, and the cost of production cannot be known to the employees at large. There is hardly any state of the market in which it would not be the greatest folly to make all of these items known to the public, but they can be made known to the representatives of the miners, and statements made regarding them can be proven, and when these statements have been made to them and they are convinced of their truth, they should be allowed to follow out their own judgment as to what should be done, and loyally supported in this action by those whom they represent.

The Springfield Strike.

We have already given in our columns a statement regarding the strike of the iron and steel workers at the mills of the Springfield Iron Co., at Springfield, Ill., and the success that this mill had attained in running their works non-union. Last week the attempt to intimidate the non-union men that had been in progress ever since they began work culminated in an attack on a number of them by the strikers, which resulted in the murder of one and the wounding of two others, one of whom will probably die. The circumstances under which this attack occurred seem to have been as follows: The men, seeing that the company were rapidly filling their places, and had succeeded in getting about enough men to run double-turn in all departments, have lately become desperate, and for some days past have been attacking such of the new men as they could find alone, or in such small numbers that they could not protect themselves. On the 13th, four of the new men left the works for a walk in the country, and while they were a mile and a half or so beyond the works they were attacked by 30 or 40 of the strikers and severely beaten. Two of them returned to the works, but the other two were driven off with a threat that if they returned to the works they would be killed. When the two men returned without their comrades there was great excitement at the mills, and the men stopped work in all departments, saying that they intended to see if they could find the absentees, and to demonstrate to the strikers that such outrages could not be endured any longer. After dark some 15 or 20 of the men left the inclosure which surrounds the works, and were ambushed and fired upon by a party of men concealed around a coal shaft and in some empty coal cars. Double-barreled shot guns were used loaded with very large shot. One man was killed, another was seriously wounded and the third very slightly.

This outrage has aroused a terrible feeling of indignation in the community, and from this time forward the strikers will have a hard time of it. The company are determined to break up all of their assemblages, so far as the law will reach them, and to thoroughly protect the new men. They in turn express themselves as determined to stand by their employers. The result will probably be to stop all further riotous proceedings, and while it may be necessary to be very careful for a time, the business will go on with less interruption. The men have been brought from such a distance that there is nothing to be done but to stand by them and persevere in the course already undertaken.

Now, we do not charge this murder on the Amalgamated Association as a body, but the arrests that have been made in connection with it indicate that members of the Amalgamated Association were concerned in it, and they will be held, and justly held, responsible for it as an organization, unless at the first opportunity that offers itself they strongly condemn murder as a means of carrying out their ends. There can be no doubt that this attack was intended to benefit the strikers, who are most of them members of the Amalgamated Association, and it is due to the good name of the organization at large, and its previous history, that it make haste to accept the first opportunity to condemn in unsparing terms such frightful outrages.

The first quarter of the present year was marked by considerable depression in almost all departments of the British iron and steel trades, various causes having worked together in checking the demand and curtailing the consumption. Stormy weather on the coast hindered shipments and retarded work in the shipbuilding yards, while the uncertainty due to our tariff question unhinged the Transatlantic trade to a greater or less extent. The course of prices at the opening of the year had a downward tendency, and even now several of the markets present anything but a pleasing spectacle. In some descriptions of raw iron, however, there has been a slight improvement during the last month

CONDITION OF THE BLAST FURNACES OF THE UNITED STATES, APRIL 1, 1883.

(Compiled for The Iron Age.)

Location.	CHARCOAL.					ANTHRACITE.					BITUMINOUS OR COKE.				
	Total number of stacks.	Number reported in blast.	Capacity per week.	Number reported out of blast.	Capacity per week.	Total number of stacks.	Number reported in blast.	Capacity per week.	Number reported out of blast.	Capacity per week.	Total number of stacks.	Number reported in blast.	Capacity per week.	Number reported out of blast.	Capacity per week.
New England	15	9	730	6	460	1	0	.....	1	160	.....	.....	.....	.....	.....
New York	16	7	555	9	644	41	27	6,522	14	3,160	.....	.....	.....	.....	.....
New Jersey .....	.....	.....	.....	.....	.....	18	10	2,760	8	1,975	.....	.....	.....	.....	.....
Spiegel .....	.....	.....	.....	.....	.....	3	1	55	2	100	.....	.....	.....	.....	.....
Pennsylvania	36	18	955	18	972	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lehigh Valley .....	.....	.....	.....	.....	.....	51	43	11,590	8	1,754	.....	.....	.....	.....	.....
Schuylkill Valley .....	.....	.....	.....	.....	.....	49	28	6,800	21	4,210	.....	.....	.....	.....	.....
Upper Susquehanna Valley .....	.....	.....	.....	.....	.....	25	15	3,799	10	2,315	.....	.....	.....	.....	.....
Lower Susquehanna Valley .....	.....	.....	.....	.....	.....	41	30	5,365	11	1,455	.....	.....	.....	.....	.....
Pittsburgh .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	16	14	10,637	2	1,350
Allegheny Valley .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	4	735	0	.....
Shenango Valley .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	31	12	4,470	19	3,470
Youghiogheny Valley .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6	4	1,230	2	540
Juniata and Conemaugh Valley .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	25	15	4,225	10	2,620
Maryland	16	4	265	12	900	5	2	325	3	330	2	0	230	.....	.....
Virginia	31	6	325	25	1,137	.....	.....	.....	.....	.....	13	4	1,200	9	3,680
North Carolina	5	0	.....	5	290	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
West Virginia	6	1	160	5	525	.....	.....	.....	.....	.....	7	3	1,042	4	1,610
Ohio—Mahoning Valley .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18	10	3,320	8	2,650
Eastern, Central and Northern	3	0	.....	3	265	.....	.....	.....	.....	.....	21	13	4,290	8	2,170
Hooking Valley .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	15	5	732	10	1,870
Hanging Rock	28	17	1,605	11	960	.....	.....	.....	.....	.....	15	10	1,695	5	740
Miscellaneous .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Kentucky .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	3	1,150	0	.....
Hanging Rock	7	2	190	5	475	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Western region and Miscellaneous	8	0	.....	8	695	.....	.....	.....	.....	.....	7	6	2,560	1	560
Tennessee	12	3	410	9	765	.....	.....	.....	.....	.....	1	1	550	0	.....
Georgia	6	3	334	3	133	.....	.....	.....	.....	.....	9	3	1,300	6	3,620
Alabama	13	6	1,060	7	780	.....	.....	.....	.....	.....	2	2	295	0	.....
Indiana	1	0	.....	1	140	.....	.....	.....	.....	.....	16	8	6,460	8	5,170
Illinois .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	0	.....	2	580
Michigan	26	12	2,623	14	2,745	.....	.....	.....	.....	.....	3	0	.....	3	1,540
Wisconsin	12	7	980	5	481	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Minnesota	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	8	4	2,310	4	2,100
Missouri	10	3	900	7	815	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Texas	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Utah	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Oregon	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Colorado .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....
Total	255	98	11,032	153	13,180	234	156	37,216	78	15,450	225	121	48,201	103	36,455

of the quarter, and it is thought that a similar movement will soon take place in the finished-iron trade. Increased purchases on American account are also looked forward to, thus making the general outlook for the new quarter more encouraging.

Washington reports have it that the Naval Advisory Board is in favor of equipping League Island Yard, near Philadelphia, with a plant and machinery necessary for the construction of iron and steel ships. Naval officers believe that the action of Congress in authorizing the construction of new steel cruisers is a forecast of the future policy of the Government touching the navy, and that the war vessels of the future will be of steel or iron, and also that the Government will soon appreciate the importance of being able to build its own ships.

OBITUARY.

John R. Wilson, a well-known iron manufacturer of Pittsburgh, a member of the firm of Wilson, Walker & Co., Limited, and of the Lucy Furnace Co., died at his residence in Allegheny, Pa., on Sunday morning last. Mr. Wilson was born in 1835. In company with his two brothers, Homer and John, he went to California about the year 1857 on a prospecting tour. Thence the brothers went to Washington and Montana Territories, remaining at the latter place until 1871, when they returned to Pittsburgh. The deceased engaged in the iron business, being for some years associated with Andrew Carnegie, Henry Phipps, Thomas N. Miller, of the Atlas Works, and others. He became some years since, at its organization, a member of the firm of Wilson, Walker & Co., which purchased the lower Union Iron Mills, at Pittsburgh, and has been largely engaged in the manufacture of forgings, especially of railway and car iron. Mr. Walker was highly respected and esteemed in iron circles, and his excellent judgment and cautious, but progressive, spirit had much to do with the eminent success of the firm of which he was a member, and also led by his advice being sought in difficult times by his associates in the iron trade.

Reorganization of Brown, Bonnell & Co.—It is reported that the Cleveland stockholders of Brown, Bonnell & Co., at Youngstown, have made a proposition to the creditors, looking to a reorganization of the company on a new basis. The proposition is reported as follows: 1. That Amasa Stone, D. P. Eels, Colonel W. H. Harris, C. A. Otis and various other Cleveland stockholders of Brown, Bonnell & Co. shall at once organize a new and distinct corporation, with a capital of \$1,000,000, and assume all the obligations, property and franchises of the present company. 2. That this new corporation will agree and bind itself to pay off all the indebtedness of Brown, Bonnell & Co., dollar for dollar, in four annual payments, with interest at 6 per cent per annum, the period of four months from May 1 to be allowed for the formation of such new corporation. It is reported that this proposition has been assented to by all the Youngstown creditors. The gentlemen whose names are mentioned above will have no trouble in carrying out their agreement if it is accepted, and it certainly would be the part of wisdom for the creditors to accept. In many cases it is believed that the creditors would accept stock in the new concern for their accounts.

As the question of Swedish trade-marks will undoubtedly be brought up should litigation ensue in the alleged fraudulent transactions in Swedish iron, referred to else-

where, it may be interesting to state that H. E. Ahrenberg, of the firm of Messrs. Ekman & Co., of Gothenburg, Sweden, has compiled a "Brand Book" of Swedish iron that is very useful to those dealing in it. A reference to Ahrenberg's book would perhaps have done much to bring about a different issue in the case which has caused so much trouble in England. When buyers are offered Swedish iron at less than the market value, as in this instance, they will do well hereafter to refer to Ahrenberg's "Sample-Book," and see if they can there find the brand offered to them.

Protests Against Low Iron Rates in the Canadian Tariff.

The following has been sent to members of the Dominion Parliament:

April 6th, 1883.
To ———, M. P., Ottawa: We call your attention to the proposed readjustment of the iron tariff, and beg to submit for your information that, before confederation, the tariff on bar iron in Ontario was 20 per cent., with no duty on the raw material, and that the tariff on bar iron under the national policy is 17½ per cent., less \$1 to \$2 duty on scrap, &c., leaving a protection of about 12½ per cent. only until the present readjustment, an inadequate amount to compete with foreign iron of general merchant sizes as used by the public. Under this policy, only three Canadian mills attempted to compete with England, &c., in general merchant iron; two of these mills use scrap iron exclusively, and the other one uses pig iron, which they make from the ore. It is now proposed to give the pig-iron makers a bonus of \$1.50 per ton on all the iron made for a certain time. This bonus is equal to nearly \$1.87 per ton on bar iron, as it will take nearly 1½ tons of pig iron to make a ton of merchant bar iron, and it is intended to give this third concern the benefit of this, to the exclusion of the other two, who have been as well endeavoring to meet the same unremunerative markets with the expectation and promises of tariff assistance as soon as the national policy was, after consideration, accepted by the Canadian people in the last general elections.

We ask you as legislators to see to it that this injustice is not done us, and to see that the other establishments who have been endeavoring to compete with the imported merchant bar receive an equivalent to the bonus, as well as the makers of merchant bar iron made from the pig metal, thus putting us all on the same footing. We would further call your attention to the fact that it is just as important to encourage and build up the manufacture of bar iron for general purposes as it is to encourage the manufacture of pig iron alone, as a very large part of the market for pig iron should be from these bar-iron makers, and is everywhere else, and will be in Canada if you will see this matter righted and justice done. We would also refer you to the tariffs of other countries to show that the more advanced an article is in manufacture—that is, the more labor spent on it—the more should be the tariff, to be in proportion to the cost of the raw material. This will not be the case as it is now proposed with iron in Canada, as pig iron is to have a bonus of \$1.50 per ton, with the present duty of \$2, equal to \$3.50 per ton in all, on, say a valuation of \$15, would be equal to nearly 22 per cent., while bar iron, costing more than twice as much for actual labor spent, has only 17½ per cent. All bar makers outside of the furnace owners, under the proposed tariff must go out of the business if you don't see this matter righted. We trust you will see the injustice of the proposed adjustment, and amend the tariff clause to include a bonus or equivalent on

"general merchant bar sizes of iron made from other raw material than pig iron in Canada, and competing in the same markets."

Respectfully yours,
ONTARIO ROLLING MILLS CO.,
Hamilton, Ont.,
SCOVILL & PURDY,
St. John, N. B.,
Manufacturers of Merchant Bar Iron.

WASHINGTON LETTER.

(From Our Own Correspondent.)

WASHINGTON, D. C., April 18, 1883.

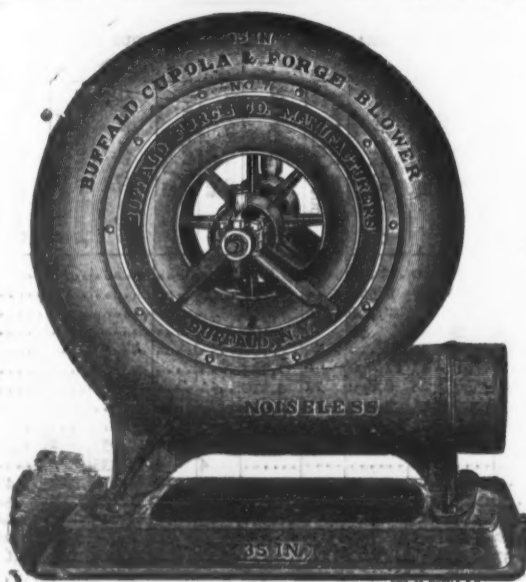
THE SPEAKERSHIP AND THE TARIFF.
The contest over the Speakership of the Forty-eighth Congress, nearly eight months off, waxed hotter every day. The friends of the rival candidates seem to appreciate the importance of being early in the field, and since the adjournment of Congress no time has been lost in communicating with Representatives, old and new. Ex-Speaker Randall has divided his time between Washington and New York. Representative Cox, of New York, remains in the city and is in intercourse with his friends. Carlisle is running his machine in the West, while Springer, of Illinois, is working the Washington end. The dividing line is, as already stated, a contest between free trade and tariff, within the ranks of the Democratic party, a question which the Speakership will determine in a great measure, so far as aggressive legislation is concerned. The election of Randall means a conservative policy and of Carlisle an ultra policy of tariff for revenue only, regardless of home industrial interests.

A STATISTICAL REVIEW.
Taking a statistical view of the situation, the way the question now stands, estimated upon the claims of the friends of the respective candidates, is about as follows: The Democratic party goes into the next House of Representatives with a majority of 59. This would give the Democrats 101, and Republicans and Greenbackers of Republican sympathies 134, out of a membership of 325. The friends of Mr. Randall, who have been making a still hunt of it, thus far count on 84 votes secured for their choice. In the Democratic caucus, were every member present, it would require 96 votes to secure the nomination. Therefore Randall, thus early in the contest, only lacks 12 votes necessary to success. It is not likely, however, that there will be more than 180 present; in that case, but 67 would be necessary to a choice. The vote claimed by Mr. Randall's friends embraces the Democratic Representatives from New England, part of those from New York, and all of New Jersey, Pennsylvania, Delaware and Maryland. He will also divide Georgia, Alabama, Louisiana, Missouri, Indiana, Ohio and Michigan. Mr. Cox will take the rest of New York and has an enthusiastic following in a number of States. The Carlisle cohorts are made up almost entirely in the South, and not all of that vote, and a scattering vote in the North.

THE DARK HORSE IN THE RACE.
The odds among the knowing ones seem to be in favor of Mr. Randall. Some think that the race between the two principal contestants, Randall and Carlisle, will be so stubborn and evenly divided that a dark horse will lead the field. In this event, the friends of Mr. Cox are holding him in training for a walkover. There are some who have not committed themselves, and who will not, but say that they will await developments. This unknown factor will decide the contest and will say whether the tariff question shall be reopened and agitated, or whether the country shall have a rest in this direction.

DIGEST OF DECISIONS.
The digest of decisions already referred to, and from advance sheets of which the de-

NEW AND IMPROVED BUFFALO CUPOLA & FORGE BLOWERS



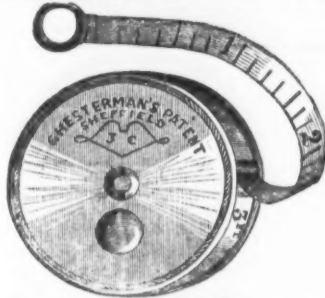
All Sizes
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for Every
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The Most
Positive,
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GUARANTEED TO GIVE
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NEW LISTS AND DISCOUNTS FURNISHED ON APPLICATION.

THE KNICKERBOCKER LAWN MOWER.



Patented June 18th, 1882, and April 3d, 1883.

THE ONLY MOWER IN MARKET WITH A
SOLID SHEAR-STEEL CUTTER.

Incomparably the Lightest Running and Best Made
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Keystone Portable Forges.

Best in the Market. Strong Blast and Easily Worked.
Durable, and give entire satisfaction. All sizes for
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CHAMPION ONE-MAN SAW



WITH PATENT ADJUSTABLE ATTACHMENT. The only Saw that can be adjusted for either a One-Man or a Two-Man Saw.
We make the following lengths, 3 1/2, 4, 4 1/2, 5 feet. Send for sample.

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IMPROVED UNDER PATENTS OF 1875 AND 1876.

Safety, Economy in Fuel, Low Cost of Maintenance, Dry Steam without Superheating, Large Reserve Power

ARE THE ADVANTAGES OFFERED BY THIS BOILER IN A PRE-EMINENT DEGREE.

3000 Horse-Power in Progress and for Immediate Delivery. Correspondence Solicited.

EDGE MOOR IRON COMPANY,

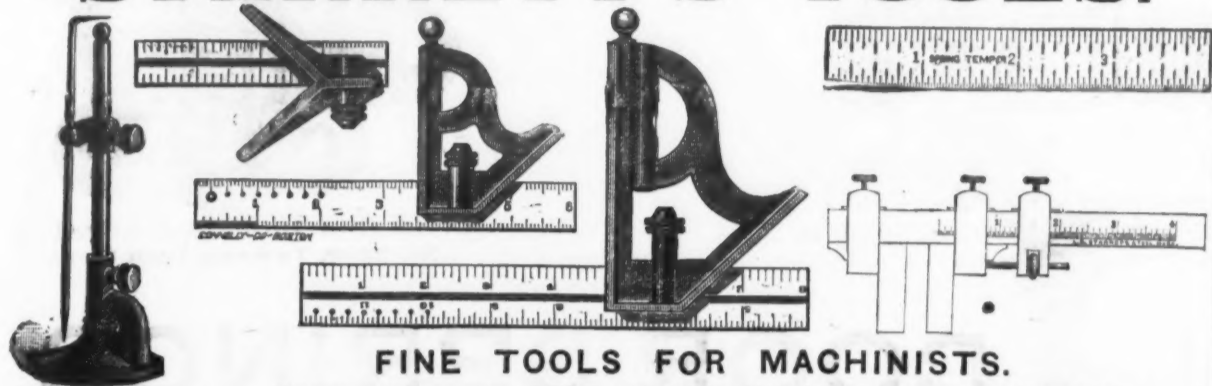
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STARRETT'S TOOLS.



FINE TOOLS FOR MACHINISTS.

GOODS WARRANTED, TRADE SOLICITED AND SATISFACTION GUARANTEED.

CAUTION.—In the Circuit Court of the United States, District of Massachusetts, January 31, 1883, Judge Lowell rendered a decision in the suit brought by L. S. Starrett, of Athol, State of Massachusetts, against The Standard Tool Co. and the Athol Machine Co. for infringing his patented squares, fraudulently stamping and advertising them as Chaplin's Patent. The court sustained Mr. Starrett's patents, and declared them infringed. An injunction was ordered against all the defendants. I hereby give notice that I shall hold all persons responsible who use or sell any infringement on my squares.

L. S. STARRETT, Athol, Mass.

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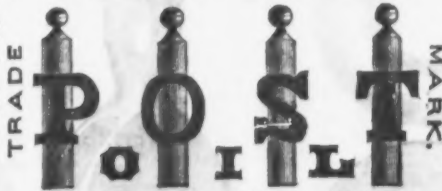
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Post's Waterproof Belt Oil and Leather Preservative,

FOR WET OR DRY LEATHER BELTING.

Leather dressed with this oil will not crack or rot, as heat, cold, water or gas has no effect on it. It will spread one-third further and last much longer than any oil for the same purpose. It never turns rancid; will keep in any climate.



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Cameron & Barkley, Charleston, S. C.
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Mantle & Cowan, Louisville, Ky.
E. F. Bradford & Co., Cincinnati, Ohio.

SCOTLAND: Robert Falconer, Glasgow.

cisions affecting iron and steel have been given in this correspondence, is now ready for distribution. The official title is "A digest of the decisions of the Treasury Department, relating to the tariff, navigation, &c., from 1872 to 1882, inclusive, with the tariff on imports into the United States and the free list indexed, and the Hawaiian reciprocity treaty." In referring to this valuable contribution to the literature of revenue and tariff, the following interesting and important facts are given: The work was begun, and the greater part of it prepared, by Mr. Frank M. Eastman, and was completed by Mr. Charles R. Dean and Mr. T. D. Sanders, all under the direction of Assistant-Secretary H. F. French. It contains a digest of all important decisions relating to the tariff and navigation, and the Marine Hospital, steamboat inspection and revenue marine services, from 1872 to 1882, inclusive. It contains also Title XXXIII of the Revised Statutes, "Duties upon Imports," with amendments. This is arranged as the tariff indexed, in which the items of the tariff are numbered for convenient reference, with a complete index by subjects. The digest refers to the decisions in the 11 volumes of the "Synopsis of Decisions" from 1872 to 1882, inclusive, by the original numbers. It refers incidentally to some decisions in earlier volumes, but is only complete within the dates named. The work is intended chiefly for the customs service, but will be valuable to manufacturers for reference upon any questions respecting the relations of their own productions to the customs duties and imported articles.

THE NEW TARIFF ACT.

Since the manuscript of this work was prepared, the tariff of March 3, 1883, has been enacted. It will be printed by the department, with the paragraphs numbered as tariff indexed is, and will be cited by the department and customs officers as "The Tariff of 1883."

JUDGE KELLEY ON PROTECTION.

The remarks of Judge Kelley, Chairman of the Committee on Ways and Means of the last Congress, at the banquet given in his honor a few days ago, have caused considerable uneasiness to some of the leaders still lingering here in the interest of a free-trade Speaker of the Forty-eighth Congress. The facts and the figures stated by Mr. Kelley are incontrovertible, and the circulation which they have received through the non-partisan medium of a post-prandial speech is calculated to make an impression upon the popular mind far beyond the campaign clap-net so often indulged in on questions under consideration with a view to legislation. His presentation of the course of economic development in the United States under the doctrines of free trade and protection is amply set forth. The speaker shows that while, during the existence of a customs tariff between 1850 and 1860, based upon the revenue idea, the production of iron and steel was stationary, and but 39,000 hands were employed, during the next two decades, under a protective policy, the number of hands employed increased to 140,000, and the amount of capital invested rose from \$50,000,000 to \$230,000,000. The wages paid in 1860 were \$12,000,000, and in 1880, \$55,000,000. The value of material consumed was, respectively, \$34,000,000 and \$190,000,000. He also demonstrated by authenticated data that the emancipation of the American people from the free-trade doctrines forced upon them by the subtle influences of foreign manufacturers, and their selfish and unpatriotic subsidized agents among our own people, had increased the value of our iron and steel manufactures from \$60,000,000 to \$296,000,000. The consolation which the free traders in Congress had always taken from the allegations that the metallurgical industries had been specially favored in the matter of legislation was exploded by comparison with other branches of industry.

THE IRON INDUSTRIES NOT SPECIALLY FAVORED.

The speaker referred to carriage building as answering this point, showing that, where 20 years ago such a thing as an American-built carriage made from parts manufactured in the United States was unknown, to-day there are more pleasure carriages built annually in the state of Ohio alone than are turned out in England and France combined. The extent of this industry may be appreciated when it is stated that the census of 1880 gave 43,000 establishments for carriage building and smithing, employing 105,000 hands and paying \$38,000,000 in wages.

VALUE OF A HOME MARKET.

Judge Kelley went further, and, in setting forth the circumstances attending railroad development and the extent to which it was carried during the two decades from 1860 to 1880, conclusively illustrated that the home market had contributed to this result. The working people meanwhile received good wages and had plenty of work, so that no one was any the poorer by a scale of prices and wages rated on a standard of fair remuneration, instead of being pruned down to the pauper rates of the Old World. At the same time, the internal trade of the United States exceeds the foreign and domestic trade of England combined. This is another potent argument in favor of the wisdom of the protective policy. The dissemination of just such information in a popular way, apart from political interests and surroundings, will have more influence upon the minds of the great mass of the people than any form of elaborate argument which the ordinary reader has no disposition to wade through. The tariff issue is one of the inevitables in the next campaign, and such speeches as Judge Kelley's are calculated to bring public attention to the subject by such approaches as will invite further inquiry.

THE HOG AS A FACTOR IN THE TARIFF.

The action of the Governments of France and Germany with respect to American meats is calculated to add an international feature to the protective issue which was not anticipated. The prohibitory decrees which have been issued against these important articles of American shipments by those nations have raised a decided commotion among the Western stock raisers and dealers, and they are already in communication with their Representatives in Congress, with a view to retaliatory measures. The Western influence, which in some quarters has been so clamorous for free trade, is now

having a practical lesson of some of the advantages of a protection of American products and manufactures against the assumptions and arbitrary acts of foreign governments. They now see how it is. They howled themselves hoarse in condemnation of fostering American iron and steel, and everything else of home production, and insisted upon opening the markets of the United States to the products of the pauper wages of the Old World. Now that, on the plea of diseased meat, these exports have been subjected to a high foreign import tax, they want protection. As a Western Representative said to the correspondent of *The Iron Age*, if our people want legislation to protect them against this discriminating action they must unite with the protectionists to secure it. The proposition is to increase the duties on wines and textiles imported from France and Germany. In a diplomatic point of view, this would be following the precedent of other countries acting under similar circumstances. There is no doubt that this will compel a coalition of the parties interested in the shipment of meats with those favoring a protective tariff for mutual support and benefit.

A CALL FOR AN EXTRA SESSION.

Among the passing incidents of official routine at the Executive Mansion is a document on the part of certain parties purporting to represent certain presumed interests of labor, urging the President to call an extra session of Congress to legislate in the interests of labor. It is not known what interests labor has to be legislated upon, nor is it at all probable, unless some specific and imperative reasons can be given, that the request will be granted. A session of Congress is an expensive indulgence, and the Constitution prescribes as much of an infliction of that sort as the business and industrial interests of the country can stand. In salaries alone for Senators and Representatives it costs over \$200,000 a month. This does not include mileage, incidentals, pay of officials and other expenses attending the running of the law-making machine. But it might be well for those who are now pressing for an extra session to anticipate the fact that before Congress in its first regular session shall have finished up its work they will have quite enough of it. The formidable free-trade element which enters into the composition of the Forty-eighth Congress will in all probability make matters interesting for them by attempts to reduce the tariff and bring American labor down to the starving rates of foreign labor. It must be apparent to all classes of the people that the agitation of the tariff, with all its baneful tendencies, is one of the chief points upon which the majority propose to make an issue. Therefore, those who claim to make the request of the President, as above indicated, had better enjoy the benefits which they now have, as they will secure nothing more the way things now stand.

THE LABOR INVESTIGATION.

While an agitation in a small way has been occasioned by a few labor men asking for an extra session, it might be observed that Senator Blair, Chairman of the Senate Committee on Education and Labor, was in the city a short time ago preparatory to holding a meeting preliminary to the investigation of the cause of strikes and relations of capital and labor. The Southern members having expressed a desire to visit their plantations during the season of seeding, the chairman agreed to delay the commencement of work on the subject matter before the committee until convenient to them. The chairman thought that it might yet be several weeks before the committee could get together. It might be as well for the laboring interests represented in the request for an extra session of Congress to await the action of this committee for a report pointing out the way of legislation on this most difficult of subjects.

CONSUMPTION AND DISTRIBUTION OF CROPS.

As the crops have a direct and important bearing upon the activity of all classes of business, the report of the Department of Agriculture, just issued, affords some important information upon the distribution of corn, wheat and cotton, and the comparative quantity still remaining in the hands of growers. The following facts therefore may be interesting. On March 1 the returns show about 36 per cent., or 588,000,000 bushels, of the corn crop of 1882 still in the hands of the growers. Of this aggregate in the different geographical divisions the proportion on hand is as follows:

	On hand March 1, 1883.	Per cent. of whole crop.	Per cent. for 5 years.
New England.....	1,298,708	29.8	32.6
Middle States.....	29,307,888	37.4	36.7
Southern States.....	171,551,062	43.5	35.9
Western States.....	381,600,106	33.8	32.9
Pacific States.....	735,734	25.4	24.5
Nevada, Colorado and Territories.....	2,982,522	38.0	25.5
Total.....	587,467,943	36.3	33.7

The unconsumed portion of the crop is largely held in the Western and Southern States, with about 3 per cent. more than usual on hand.

The returns of wheat indicate 28 per cent., or about 143,000,000 bushels, of the crop of 1882 remaining on hand, as follows:

	On hand March 1, 1883.	Per cent. of whole crop.	Per cent. for 5 years.
New England.....	408,234	37.	38.1
Middle States.....	12,734,028	35.6	34.7
Southern States.....	11,474,74	25.	22.
Western States.....	103,613,660	29.2	27.1
Pacific States.....	10,819,437	23.2	25.9
Colorado, Dakota and Territories.....	4,118,236	23.2	23.9
Total.....	141,316,869	28.5	26.9

The largest quantity was held in Ohio for higher prices. It will be seen that over 2 per cent. more than the average remains on hand. The returns of cotton sent to market from the plantations indicate an aggregate of 5,990,000 bales gone forward up to March 1, or about 86½ per cent. of the crop. It will have been seen, with respect to cereals, that a surplus equal to any contingency of failure of crop or excessive demand remains on hand.

The Pittsburgh Testing Laboratory, which was established a few months since by Wm. Kent and Wm. F. Zimmerman, for mechanical tests of materials of construction, has

PERRY'S PATENT REPAIR LINKS.



No. 1, for repairing Small Trace Chain, per dozen, \$10.00. No. 2, for repairing Medium-Size Chain, per dozen, \$12.00. No. 3, for repairing Log Chain, per dozen, \$15.00.

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2116 Market St., ST. LOUIS, MO.

MANUFACTURERS OF
REFINED MALLEABLE IRON CASTINGS,
ALL KINDS OF

Small Gray Iron Castings, General Hardware, &c., &c.

THE LOW PATENT FEED WATER HEATER & PURIFIER,



Heating and Purifying Water for Steam Boilers.
Patented July 12 1877.
Has Straight Tubes.

SIMPLICITY,
RELIABILITY and
EFFICIENCY
At Less Cost
Than any Other.

Write for prices and further information to the manufacturers,

Lowe & Watson,
BRIDGEPORT, CONN.

VARIETY METAL BOOM.

Iron Foundry and Machine Shop.
STEAM HEATING BY DIRECT RADIATION in all its Branches a Specialty. Brass and other Metal Moulding, Casting and Finishing. Noiseless Vertical Engines, Hydrants, Fire Plugs, &c.

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158 London Wall Street, LONDON, ENGLAND.

IRON, TIN PLATE AND METAL

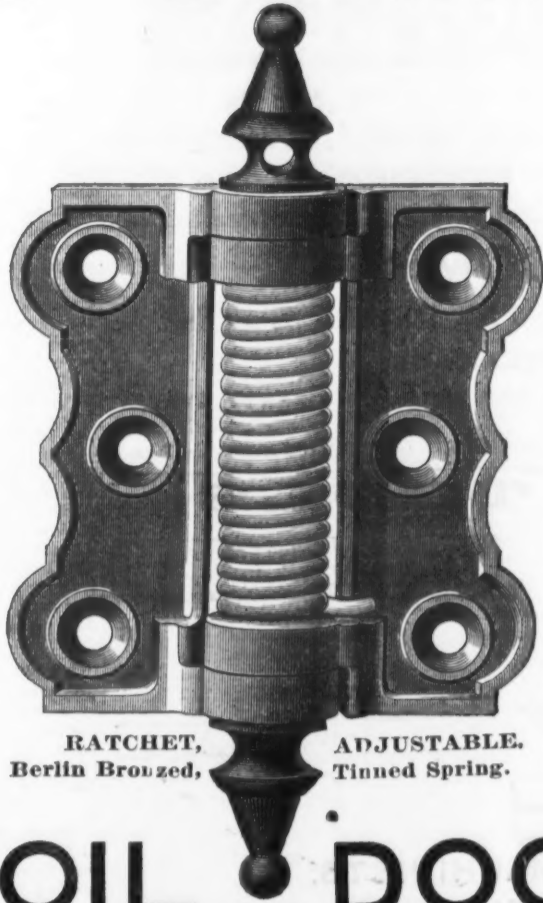
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Scrap Iron, Old Rails, Pig Iron, &c., &c., quoted at lowest of prices. Cable Address "Gentian," London.

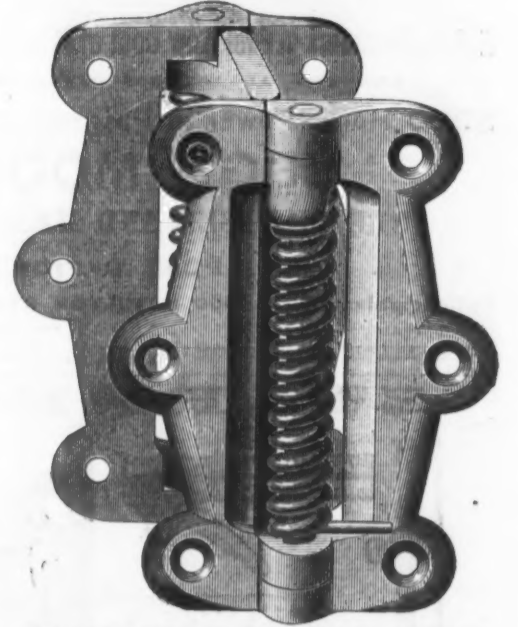
SARGENT'S SPRING HINGES,



MALLEABLE IRON, BRASS SPRING.
No. 250, To Swing One Way.



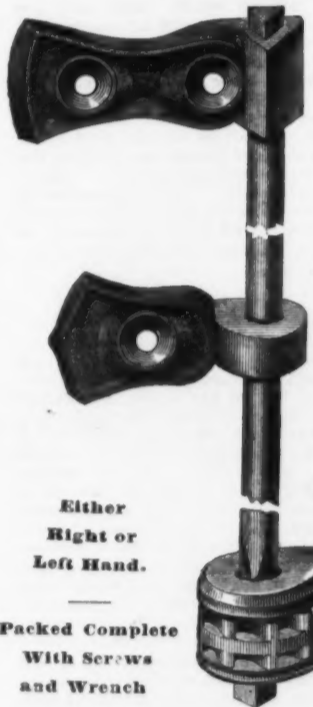
RATCHET, ADJUSTABLE.
Berlin Bronzed, Tinned Spring.



MALLEABLE IRON, BRASS SPRING.
No. 2250, To Swing Both Ways.

ROD AND COIL DOOR SPRINGS,

"S" DOOR SPRINGS.



Put the Brackets on as seen in the cut, and on the opposite side of the Steel Rod for a door swinging the other way.
Put the ratchet wheel in the bottom bracket, with the teeth toward the Pawl or Stop.



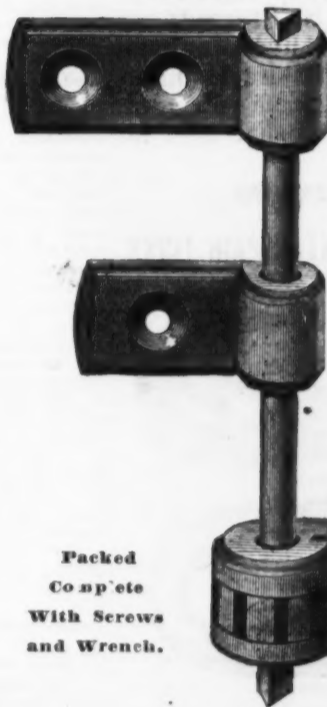
Apply the wrench to the end of the rod below the bottom bracket, twist the rod until sufficient power is obtained, and then push the pawl into the teeth of the ratchet wheel.

Either
Right or
Left Hand.

Packed Complete
With Screws
and Wrench

Bottom Bracket, with Ratchet
Wheel and Pawl in Place.

TORREY DOOR SPRINGS.



This spring can be put on, and ANY AMOUNT OF POWER APPLIED easily and quickly, and it is equally applicable to closing the door or holding it open. By simply SLIDING THE CATCH the power can be instantly removed and the door allowed to act entirely free.

The same Spring is suitable for a Right or Left Hand Door.

Packed
Complete
With Screws
and Wrench.

THE VICTOR.



BEST in the MARKET.

The mechanism for adjusting the Victor and Champion is the same.

Put on the spring diagonally, with the top always to the right.

Put on the top bracket first, and as near the edge as possible.

Then put on the bottom bracket, which also should be near the edge.

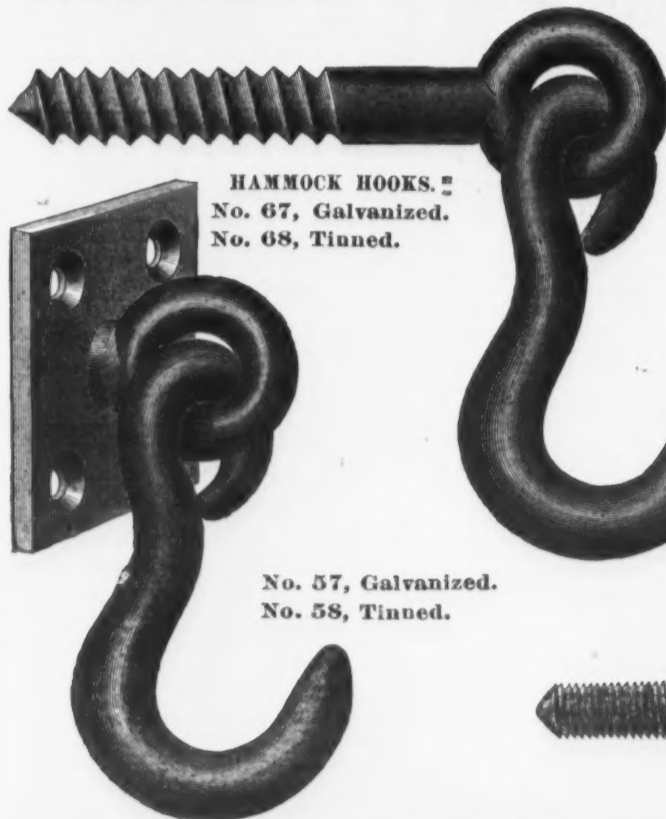
To tighten the spring, lift the collar or fastening; apply the wrench and tighten the spring as desired by turning to the left; when taut as wished, drop the collar back to place.

Easily adjusted. No pieces to lose. Tension can be applied or released instantly.

THE CHAMPION.



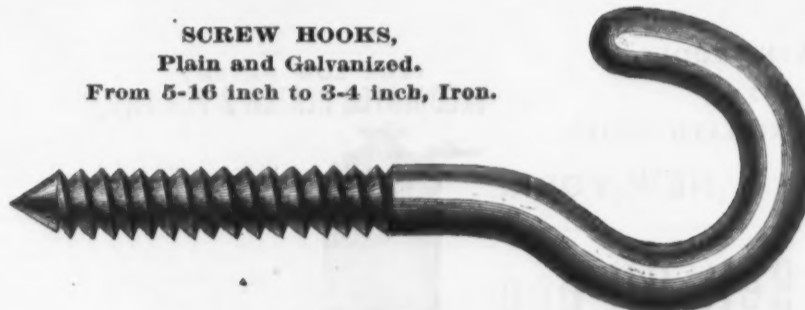
HAMMOCK AND SWING HOOKS, AND AWNING PULLEYS.



HAMMOCK HOOKS.
No. 67, Galvanized.
No. 68, Tinned.

No. 57, Galvanized.
No. 58, Tinned.

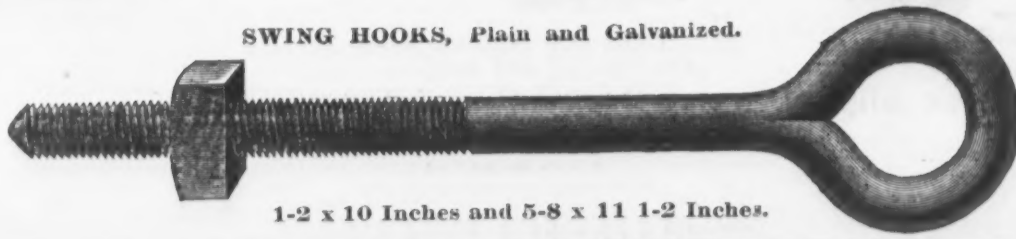
SCREW HOOKS,
Plain and Galvanized.
From 5-16 inch to 3-4 inch, Iron.



EYE BOLTS,
Plain and Galvanized.
From 5-16 inch to 3-4 inch, Iron.



SWING HOOKS, Plain and Galvanized.



1-2 x 10 Inches and 5-8 x 11 1-2 Inches.

AWNING PULLEYS.
All Sizes.



SARGENT & Co. HARDWARE MANUFACTURERS. NEW YORK & NEW HAVEN, CONN.

just added a chemical department for the convenience of its patrons. The laboratory will shortly issue a new circular and price list for both mechanical and chemical tests.

An Iron Sailing Vessel.

The first sailing vessel built wholly of iron was launched at Chester on the 14th inst., from the yard of John Roach. She is owned by Mr. W. H. Starbuck, and is intended for the Oregon trade, and is of extremely light draft, to permit of her passing over the Columbia River bar. The keel of a sister ship to this one, also for Mr. Starbuck, has been laid at Mr. Gorringe's shipyard, at Philadelphia, and the ship will be ready for launching in about four months.

The ship just launched is 270 feet over all, 248 feet on the low-water line, 42 feet beam, 23½ feet depth of hold, and, with a dead weight of 3750 tons of cargo, will have an extreme draft of 21 feet 6 inches. With 2500 tons of weight she will draw 18 feet 9 inches. It is calculated that she will carry 4250 tons of measurement. Her keel was laid in December last, and is of the best hammered iron, 10 by 3 inches; the stem and stern-post of the same material, 10 by 4½ inches. Her frames are 6 by 3½ inches, span 2 feet from center to center. The lower deck-beams are 11 inches by 11-16ths inch, and those of the upper deck are 10 inches by 10-16ths inch. The plating is laid lap-streak throughout, 15-16ths inch from the garboard, and 12-16ths above the bends. Both decks are laid in narrow planking of yellow pine, 3½ x 3½ inches, which has an extremely fine effect. The mast partner-plates are of extra size, and are secured by diagonal braces to the stringers. In fact, the upper deck, for its whole length, is diagonally braced, while there are diagonals at each partner on the lower deck. Under each mast for a space of 20 feet is a heavy rider keelson. The ship has been built under an especial survey of the Bureau Veritas, and the surveyor, who was present at the launch yesterday, said that the Tillie E. Starbuck is the strongest and best-built vessel that has ever passed under his inspection. She will receive from the bureau its highest classification. On deck she will have a low topgallant forecastle, with a chain life-guard around it. Between the fore and main hatches is an iron deck-house, in which will be the galley, the quarters for the crew and a small engine for hoisting or pumping purposes. She will have a poop deck about 90 feet long, beneath which is the cabin, which is entered in front from the main deck and also from a companion-way on one side of the after part of the poop deck. Aft on this deck is a wheel-house for the helmsman, inclosed in which is a right and left screw steering-gear. Below are rooms for the captain and officers and two spare staterooms for passengers, and in the forward part of the poop is the pantry and sundry storerooms.

A Burglar-Proof Treasure Vault.

The State Safe Deposit Vaults in this city are of very ingenious construction, and while possibly not impregnable, the chance of their being broken into at any time is certainly very small. The interior dimensions of the great vault are: Length, 46 feet; width, 18 feet; height, 8 feet. All of the walls (bottom, top and sides) are made of ½-inch plates of welded five-ply steel and iron, and are thicker and heavier than those of any other similar structure in the country. Every plate was tested before being used, and found to be "drill-proof" under 200 tons pressure upon the drill, which is a far greater pressure than all the burglars in the world will ever be able to bring against a safe. Attached to this vault, and being made a part of it by solid bent and welded angles interlocked into the vault walls, and fastened with conical arbors, are two large vestibules, or doorways, constructed of the same material, in the same manner, but of still greater thickness. To each doorway are two pairs of folding burglar-proof doors. Both the outer and inner doors are of tremendous thickness and strength. The edges of the doors being dovetailed and having double rows of tenon and groove, are both wedge and explosion proof. All the doors are swung on Hall's patent traverse hinges, and, by the use of levers, move squarely in and out of the tenon and groove and dovetail in jamb. Each vestibule, with its doors weighs over 16 tons. The vault doors are furnished with combination bank locks. On each of the outer doors is a double time lock, with opening device in case of lock-out—an ingenious invention as well as a valuable improvement. A fire-proof wall of concrete surrounds the whole of this huge vault. Inside the vault is ample room for 2000 boxes of different sizes, the larger ones having square bolt frames, round bolts and combination locks, the smaller boxes having peculiarly-adapted tumbler key locks. The windows on the street are guarded by chrome steel and wire gratings of extra thickness and weight. The vaults are proof against dampness and impure air. They are well lighted. Two watchmen are constantly on duty all night, with indicators to show every half-hour that they are wide awake and constantly at their posts. These are supplemented also with patent burglar alarms working by electricity, which give notice of the approach of any person, even on the door mats.

James Marshall & Co.—Telegraphic advices from Pittsburgh, under date of April 16, made the following announcement: "James Marshall & Co., iron pipe manufacturers, one of the largest firms in the business, made an assignment to-day to George J. Whitney for the benefit of creditors. The liabilities are \$1,500,000, and the assets about \$1,250,000. The failure was caused by too extensive speculation in pig iron. Since 1879 James Marshall has been purchasing largely of pig iron, under the belief that prices must advance. The dullness of trade, after a long strike, then the uncertainty in regard to what Congress would do about the tariff, and finally the failure of the expected advance after the tariff bill had been passed, all contributed to precipitating the crash. The Pittsburgh banks are the largest creditors, but they will lose nothing, as they have col-

laterals for their loans which will realize the amount of the paper held by them. Among outside creditors are Marshall Brothers, Philadelphia, the Rockhill Furnace Company, Fayette; Receiver Brown, of Brown, Bonnell & Co., Youngstown, Ohio; Hogsett, Hanna & Co., Uniontown, Pa.; the Dunbar Furnace Company, and the Fairchance Furnace Company. The failure created surprise in business circles. The members of the firm are very highly regarded, and have the warmest sympathy of the business community."

Accidents in Mines by the Breaking of Winding Ropes.

Looking through our English exchanges we frequently find accounts of fatal accidents resulting from the breaking of winding ropes. Two lamentable disasters of this character, which occurred a short time since, have directed special attention to this subject in England, and suggestions for the prevention of such accidents are freely offered. It seems to us that the investigations as to the causes of these accidents are, as a rule, superficial, and that insufficient attention is given to the true causes. Accidents so obviously and easily avoidable as those arising from the giving way of winding ropes should be impossible. Measures have been adopted to enforce due precautions against accidents in mines by compelling proper ventilation and periodical inspection, and preventing the use of naked lights in workings where accumulations of gas are to be expected, but safety in the raising and lowering of cages with their human freight seems to be strangely neglected. In one of the cases above referred to it seems that the cage was being raised by a rope of which one strand was known to be broken, and this, combined with other irregularities in the working of the pit, offers a sufficient explanation of the accident, and at the same time shows how easily this particular accident could have been avoided. In the other case, according to the Birmingham Post, the rope was sound, but owing to some imperfection in the machinery, assisted probably by the pressure of the wind, it did not run true, and mounted the flange of the pulley as it was being run out. On passing over the flange it would naturally slip down with a sharp jerk upon the axle of the pulley, and be severed as it passed through the ring of the disengaging plate. This, at all events, is the theory of the Government inspector, and it seems, from the evidence, the most likely explanation of the accident. But, continues the Post, an explanation is not a justification, and we have yet to learn why the accidental breakage of a rope under such circumstances should be attended with fatal consequences, when, at small expense, every cage in the district might be fitted with a safety apparatus that would arrest it in mid-air in the event of the rope giving way. Appliances of this kind are familiar to every colliery owner, and though all are not equally effective, the worst are better than none at all.

The Harrison Steel Co. vs. the Bessemer Steel Co.—The Bessemer Steel Co., in their proceedings against the Harrison Steel Co. and the Harrison Wire Co., both of St. Louis, instituted for the purpose of preventing the latter two from using the basic process of conversion in the proposed extensive works at Harrison, Ill., under license from Jacob Reese, claim that they own the Reese patents. This is denied by the defendants and the inventor. Mr. Reese is said to have assigned his patents to the Harrison Steel Co., allowing them to use his process. The Bessemer Co. have consequently filed a bill in the Circuit Court of the United States, St. Louis, praying for an injunction to restrain the former company from using the Reese process. In the case, as it was entered, Mr. Reese was made a party defendant, in view of which the Harrison people urged that he was an indispensable party, and asked the Court that he be so made. Within the past few weeks argument was made on the point, and the matter was taken under advisement and continued until the September term. The inference to be drawn from this action of the Court is that the judges see no way in which the case can proceed without Reese as a party, and it is believed by counsel for the Harrison people that no other final order will ever be entered in the case except "dismissal of the bill without prejudice." Meanwhile the Harrison Steel Co. will proceed to carry out their plans in the erection of their works in Jackson County, Ill.

American Society of Mechanical Engineers.—The next meeting of the American Society of Mechanical Engineers will be held at Cleveland on June 12, this date having been selected in order to avoid conflict with the American Society of Civil Engineers, which meets on June 10, and the American Institute of Mining Engineers, whose meeting, as stated elsewhere in this issue, will be held during the first week of that month. The members will, by this arrangement, moreover, have a favorable opportunity of visiting the National Exposition of Railway Appliances, at Chicago, thus combining both trips in one, and we do not doubt that the attractive features of the meeting will be instrumental in securing a liberal attendance.

Dr. Thos. M. Drown, secretary of the American Institute of Mining Engineers, has issued notices to the different members informing them that the next meeting of the Institute will be held at Roanoke, Va., during the first week in June. A detailed programme of sessions and excursions will be issued next month, and members are requested to send to the secretary as soon as possible the titles of the papers which they intend to present at this meeting.

The report of the British Iron Trade Association, recently issued, shows that the total output of coal in Great Britain for the year 1882 amounted to 156,499,977 tons, being an increase of 2,315,677 tons, as compared with 1881, and an increase of 9,530,568 tons on the production of 1880. Scotland turned out 20,515,134 tons, being a decrease of 307,921, and Ireland 127,777 tons, showing an increase of 192.

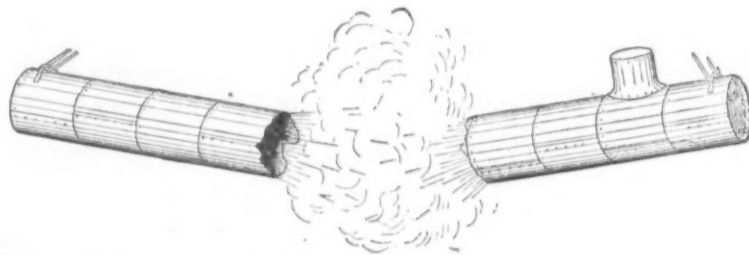
Dangers of Long Cylinder Boilers.

In a recent issue of the *Locomotive* we find an interesting and valuable article upon the dangers of long cylinder boilers, from the pen of F. B. Allen, which we give entire:

Perhaps some of our readers may take exception to our heading, for we recollect in our early experience connected with the introduction in this country of boiler inspection, as a safeguard against explosion, how confidently we were informed by many of our steam users, "Your system is excellent; we wish you every success, but we do not need it. You haven't seen our boilers, have you? We use plain cylinder boilers." Sometimes this was said regretfully at the thought of our having lost so much valuable time, or possibly because they could not find even an excuse in their own estimation for the employment of a system of supervision they commended so highly, such was their con-

being in good working order. The feed supply was pumped from a pond on the premises into a large tank, thence through part of an old boiler—fitted up as an open heater—into the boilers through a 2-inch feed-pipe on top of boiler, as shown, by an independent pump. The main engine exhausted into the heater, possibly raising the temperature of the feed to 80° or 90° when the engine was in operation; when it was not, its temperature would only be slightly above that of the pond, which at that season of the year was 50°. It was quite muddy at the time of our visit, and it appeared, from an examination of the exploded boiler, to form a deposit of sediment and a troublesome lining scale.

It had been noticed some 30 minutes before the explosion occurred that this boiler was leaking on the bottom girth seam between the third and fourth courses from the front end; the attendant stated to one of the men near him that the pump was on, and



Dangers of Long Cylinder Boilers.—Fig. 1.—Break Complete.—Projection of the Shell.

fidence in plain cylinder boilers. Some of these friends have since learned by sad experience their mistake, and that plain cylinder boilers, to be safe, need the most careful attention, even more than some other types.

We are not insensible to the many advantages in accessibility for cleaning or repairs offered by the plain cylinder boiler in certain localities, particularly when the feed-water is muddy or deposits a troublesome scale; also its advantages for utilizing the waste heat of furnaces, nor to its construction being a form of strength within certain limitations, and subject to the practical conditions of setting and use we have from time to time pointed out. The experience of this company causes it to regard with some anxiety the use of long boilers. In the plain cylinder type, where the diameter is practically limited to about 42 inches, and rarely exceeds 48 inches, its length must be increased to obtain the necessary heating surface. Lengths of from 40 to 60 feet are common, and one case is reported where the length exceeds 100 feet, and therein lies the danger.

It is not our purpose to excite needless alarm among users of this type of boilers, but

it lost over a gauge of water in less than 15 minutes. After watching the leak for a few minutes he became alarmed and reported it to the chief engineer, who reached the boiler but a moment before the explosion, and was killed; possibly he was shutting the stop-valve between that and the other boilers at the time, for it was found closed afterward. The rupture was through the line of rivet holes of the inside lap seam, where it had been observed to be leaking—C D, Fig. 2. The boiler broke into two parts, as is usual in such cases, which were projected by the explosion a distance of 500 feet and 300 feet respectively in opposite directions; one of the parts in its flight struck some sharp object, possibly some broken part of the housings of the rolls, and cut out a strip of iron 20 inches long by ¾ inch wide across the grain of the sheet A, Fig. 2. This strip was afterward found curled up like a shaving, and showed that part of the iron was of fair quality; the iron generally presented a fibrous appearance, though there was some crystallization observable along ruptured edges of the lap seam. With the preceding data before us, we think it will not be difficult to determine the probable cause of the ex-

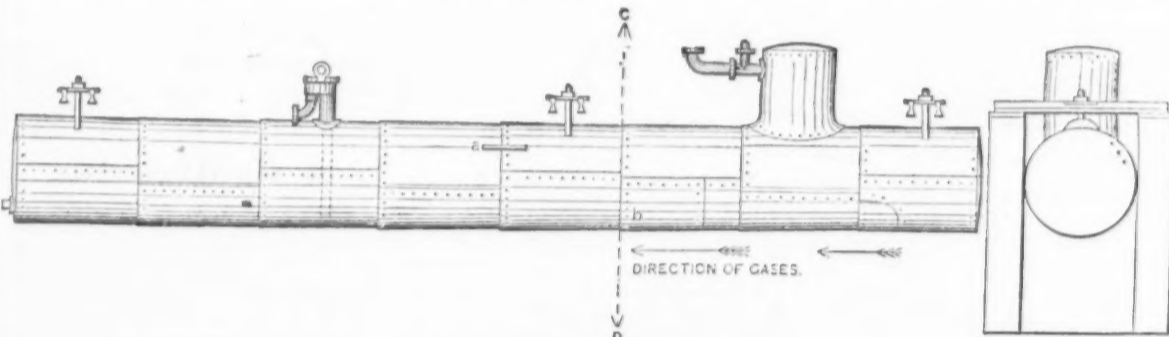


Fig. 2.—A Common Plain Cylinder Rolling Mill Boiler.

we submit in all candor that in boilers of such great length the question of setting is one of the greatest importance. We have devoted some years of study to the solution of this problem under conditions of everyday practice among the thousands of boilers under our supervision. Limited space forbids the further consideration of this branch of our subject at this time. The exploded boiler illustrated and described in the following sketch will explain many of the dangers and difficulties we have referred to, even under good care and management, such as is commonly found in our rolling mills and blast furnaces throughout the country.

The boiler, Fig. 2, was of the plain cylinder construction, 40 inches in diameter and 30 feet long. The shell was composed of eight courses of iron, single riveted, varying in thickness from .290 to .312 inch. Upon one of the plates appeared the brand of a well-known manufacturer; this was the only brand found. It was erected in a brick setting, suspended at three points in its length by substantial straps riveted on the

plosion. It seems probable, from a study of the circumstances, that the intermediate firewalls had settled, assuming that they were properly set at first, or that some of the attachments forming the middle support had yielded, leaving that part of the boiler without other support than the resistance afforded by the strength of its material. The temperature of the furnace to the heat of which the boiler is exposed varies considerably at different times, as, for instance, between the time when it is maintaining a heat and afterward when that heat is withdrawn. It will be readily seen that these variations of temperature, with their attendant expansion and contraction, cause a movement of the boiler, the effect of which is more disastrous to the riveted lap seams, owing to their greater rigidity, than to the solid plate. To this strain the boiler was gradually yielding at its weakest point—the girth seam—and gave warning of its distress by leaking. We do not know how long it had been leaking, but simply that it had become serious enough on the day of explo-

4, which, though prepared and used to illustrate another explosion varying slightly in details, was alike in principle. That the fore-and-aft braces are a valuable reinforcement to boilers of this description has been demonstrated to our satisfaction and that of our patrons. Yet it would seem that their value should not need a proof.

We would urge again, emphasized by the experience of this and other explosions under somewhat similar circumstances, that when a boiler gives signs of distress by unusual leaking at its seams or by other well-known indications, it must at once and with the least possible disturbance be put out of service until it can be thoroughly examined by a competent inspector and the nature of the defect determined. The average water-tender puts a heavy feed on the boiler and gets a ladder with which he may climb up and watch the spread of the leak. In opening the flue doors in the setting to afford him the necessary view, unwittingly, no doubt, he permits a stream of cold air to sweep the boiler bottom, which adds another

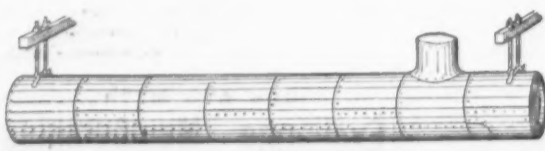


Fig. 3.—The Second Boiler Before the Explosion.

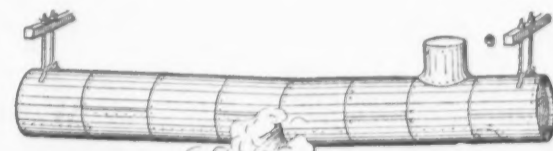


Fig. 4.—Beginning of Rupture.

boiler, and attached to hook bolts and plates at each of the points of suspension by two cross-bars of railroad iron, which extended transversely across the setting and rested on pier walls built up from the side walls, as will appear by reference to Fig. 2. This boiler was one of thirteen in use; it was built in 1872 by a firm having a good local reputation, but it had not been used continuously since that time, the works having lain idle for three years. During last year its working pressure was about 60 pounds; it had a safety-valve of 3 inches diameter in working order set to blow off at 70 pounds; frequent repairs had been made; two patches and a new half-sheet, all on the bottom of the shell, were put on at the time of last repair one year ago; it was last examined and washed out by one of the engineers two days before the explosion; as he reported no defects, it is believed he regarded the boiler as

sion to attract the engineer's attention by a sudden loss of water. This occurred after the engine had been shut down, in the interval of an hour which elapsed between the day and night shifts.

As soon as the engine stopped, the engineer, as was his habit, checked the draft by opening the various doors in the setting, and prevented the further rise of steam pressure by feeding the boilers. Putting a feed on this boiler first, he pumped it up to three full gauges of water. As we have pointed out, the temperature of this feed was close to 50°. What must be the effect of such a quantity of water at a low temperature discharged within a few inches of the bottom of the boiler, and augmented by the injury from the currents of cold air admitted through the open doors in the setting, upon a boiler expanded to the temperature of its inclosing furnace? Would not the

important element to its destruction, and perhaps his own. We would as soon think of entering a powder magazine with a lighted cigar as to do either of these things at the time or under the circumstances we have described.

The chief factor of England's export trade is her cotton manufactures. The export of piece goods last year was valued at \$314,723,000, a decrease of about \$15,000,000. The export of cotton yarn was valued at \$64,335,000, a decrease of about \$1,500,000. The entire export of cotton manufactures was \$379,058,000, a decrease of \$16,500,000. Of the piece goods and yarn, India took to the value of \$104,000,000; China, \$26,000,000; Turkey, \$24,000,000; Italy, \$10,000,000; Australia, \$9,875,000; the United States, \$8,810,000, and France, \$8,000,000.

Special Notices.

New & Second-Hand Machinery.
FEB. 21, 1883.
 1 Engine Lathe, 14 in. x 5, 6, 7 and 8 ft Grant & Bogert.
 1 11 20 in. x 12 ft., Grant & Bogert. New.
 1 11 24 in. x 15 ft. Good order.

[illegible]

For Sale.

Established 1893. Garliver Bros. "Standard
Savage" Fire Brick Works, situated at Hillsdale,
Calif., near the intersection of the Santa Fe and
on Bedford Branch of P. R. R. Has convenient
shipping arrangements on both roads. Works
consist of a large plant for making all machinery,
constructors and arranged that they can be
separately or together. One of the buildings
entirely new, erected last year. Capacity of
plant is 100,000 bricks per day. Also a large
clay in abundance, mined on royalty, and
delivered direct into works by gravity. Inclined plane
and tram road, large portion of which was laid
out by the Garliver Bros. Works. Capacity of
plant over 35 barrels per hour. Also mountain
stream, delivering water by gravity into tanks at
works. Seven acres of land, with good fence
and water, for first class orchard. Also a
facturing and shipping brick direct from kilns
into cars. Good and growing tract established.
Also a large tract of land, situated on the
Mount Savage clay. Statements of business done
will be shown to responsible parties desirous of
purchasing. Our good will and influence to go
along with the further information desired will
be cheerfully given by

GARDNER BROS.,
Lockport, Pa.

For Sale.

Established in 1864, Gardner Bros.' Gas Retort and Fire Brick Works, situated at Lockport station, on P. R. R., 40 miles from Pittsburgh, Pa., the works consist of complete plant for manufacturing Clay Gas Retorts, Settings, Blocks, Tile and Fire Brick. Capacity, about 200 retorts, with necessary settings, and 1,000,000 fire brick per month. Clay and coal mined on the premises within short distance of the works and haul to the works over three acres of land, with all necessary buildings, a number of tenements and town lots. P. R. R. has side track alongside our kilns. Good trade established. Our good will and influence to go with sale. Statements of business done will be given to responsible parties desirous of purchasing. Any further information desired will be cheerfully given by

GARDNER BROS.,
Lockport, Pa.

FOR SALE.

we Cast Iron Vacuum Pan. Vacuum and water pumps and all attachments.
we Granulator, with attachments.
we large Mixer, with attachments.
we No. 5 Vacuum Pump.
we sugar Packers.
we Agitating Engines.
we Steam Engines.
we Char. Filters.
we Scum Presses.

The above is a portion of the Machinery formerly used at Baltimore Scream Sugar Refinery, Baltimore, Md. For information apply to GEO. GRAHAM, P. O. Box 123, Baltimore, Md., or to E. ADAM, n. e. cor. Lombard and Concord Sts., Baltimore.

STEAM PUMPS For Sale.

A large number of Steam Pumps of all makes, and ranging in size from small tank or boiler feeds to very heavy service machines. While the stock lasts good bargains are open to Miners, Water Works, Rolling Mills, Furnaces, and any one needing to move fluids by steam. Call upon or address

JNO. A. HINCKLEY,
Purchasing Agent of the United Pipe Lines,
Oil City, Pa.

For Sale.

For particulars and price address
J. J. LIPPINCOTT & CO.,
132 South 4th st., Philadelphia, Pa.

36 Inch Lathe for Sale.

medium weight 36 in. x 12 ft. bed Lathe.

GEO. A. OHL & CO.,
East Newark, N. J.

For Sale.
—
stock of Hardware, with a good business, in

of the best towns in Central Iowa. Will be
cheap, with or without the building.
Address A. G. THOMPSON,
Cedar Falls, Iowa.

For Sale.

—

An old established Hardware and Tin Business

growing town in Western New York. Stock
ood condition and trade increasing.
address B. H.,
ice of *The Iron Age*, 83 Reade st., New York.

the quality and price of our goods will at all times entitle us to a liberal share of your patronage, which we respectfully solicit. We need only to refer you to the names of the officers of this company as a sufficient guarantee that the quality of our production will be of the very highest standard. Having secured the services of men of long practical experience, selecting them with special reference to their known ability and perfect knowledge of the Wire business in its every detail in their several departments, we start our business and works with the full benefit of years of thorough training and practical experience, added to the latest and best improved machinery and patented appliances, with unexcelled facilities in buildings and location for manufacturing all descriptions of Wire at minimum cost to produce best results.

We know, as regards quality of stock used and the care taken in its manipulation, that there cannot be a better quality of Wire made than that we offer you; we therefore solicit your patronage with the full assurance that we offer you goods second to none. We shall be pleased to have your orders, which shall have our careful and personal attention.

Yours truly,

AMERICAN WIRE CO.

William H. Haskell Co., manufacturers of Bolts and Coach Screws, send us the following announcement:

PAWTUCKET, R. I., April 6, 1883.

DEAR SIR: We beg leave to call your attention to the fact of our having elected Mr. Daniel A. Hunt to the office of agent of this company. He is well known to many from his long connection with the Providence Tool Co. He will devote his time for the present to calling upon our friends and learning their wants, and we trust to a continuance of the pleasant relations so long existing between us. We shall endeavor to maintain the high standard of our goods, which have so long been known in the market, and with prompt attention and reasonable prices hope to receive your future orders.

Respectfully yours,

WILLIAM H. HASKELL CO.

On the first of next month the New York office and salesroom of the Yale Lock Mfg. Co. will be removed from No. 53 Chambers street to No. 62 Reade street. In announcing this removal, the company say:

The new premises are located on the north side of the street, a few doors west of Broadway, and include a handsome store with fine basements. The former will be devoted to our Lock and Hardware department, and to the display of samples of our various products. The basement, which is well finished and lighted, will afford room for samples of our larger Hoisting Machines, and for carrying a full stock of our heavier lines of goods, from which we will thus be able to fill all orders promptly at sight.

The business of our New York office will continue, as heretofore, in charge of the assistant treasurer of the company, Mr. Thos. F. Keating, who is prepared to answer all inquiries and to attend to all business as promptly and as fully as from the Stamford office. Our out-of-town customers are cordially invited to call upon Mr. Keating whenever in the city. Special attention is called to the fact that our New York office includes a fitting and repairing department, where we are prepared to replace broken or worn-out parts of Locks, and to repair the same, and also to furnish duplicate Keys, or Locks in sets with Keys alike, at short notice, and without the delay of sending to the works.

Our readers will remember that during the winter we have more than once referred to the litigation against Barney & Berry for infringement of patents. They now request us to publish the following announcement to their customers:

SPRINGFIELD, MASS., April 17, 1883.

Our attention has been drawn to a circular dated the 7th instant, issued by Peck & Snyder to parties who have purchased of Mr. Robert Gibson, during the past season, the "Automatic" Skates manufactured by us, wherein our customers are requested to report to Peck & Snyder the number of Skates sold by them and the number remaining on hand. Peck & Snyder have had no suit with our former agent, Mr. Gibson, but a suit of Edward Spaeth was commenced against him, charging that the "Automatic" Skates was an infringement of the Charles T. Day patent for an eccentrically pivoted lever, combined and arranged with the heel and toe clamps.

We are ready to have Mr. Gibson, our former agent for the sale of "Automatic" Skates, account for all Skates which he has sold to our customers, and shall assume, ourselves, the responsibility for such Skates; and after the Master, to whom the case is referred to take an account, has made his report, either pay the small sum which can be allowed as damages, or, if the sum is anything worth disputing about, we shall test the validity of the reissued patent of Day before the Supreme Court of the United States. Meanwhile we request each one of our customers to make no report to Peck & Snyder, as requested in their circular of the 7th instant. The accounting to be made by Mr. Gibson will cover all Skates sold to them, and if any attempt is made to harass any of our customers by suits, we know how to protect them. Dealers having any of the "Automatic" Skates on hand are requested to return them to us, and we will replace them with our New Lever Skate, to be known as the "American Rink."

BARNEY & BERRY.

IRON.

American Pig.—The conditions which for some weeks have characterized the market are still the prevailing features. The demand is far below the production, and the pressure of accumulating stocks is increasing. While the companies are nominally keeping up their prices, a good deal of iron is selling on private terms in a quiet way at concessions, and indications are not wanting of a general and open decline. The 60,000 tons or more of iron which will be thrown on the market by the failure of James Marshall & Co., while it may not affect this market very

directly, will, it is feared, have a considerable indirect influence. Foundry Irons are much duller than Forge, of which we note a sale at \$19 at furnace. We quote: Foundry No. 1, \$23 @ \$24; Foundry No. 2, \$21 @ \$22; Gray Forge, \$19.50 @ \$20.50.

Scotch Pig.—There is little or no change to note in this branch of the trade. The demand is limited and transactions on a small scale, but, importations being in proportion, there is no accumulation of stocks. We quote Eglington, \$22 from yard; Carnbroe, \$22 from ship; Glengarnock, \$22 @ \$23 from ship and yard; Dalmellington, \$21.50 @ \$22 from ship and yard; Summerlee, \$24.50 from ship; Coltness, \$24.50 @ \$24.75 from ship; Gartsherrie, \$25 from yard; Langloan, \$24.50 from ship.

Bar Iron.—During the past week the market has been irregular and unsettled. There has been a noticeable decline in demand, and buyers are, if possible, more cautious than heretofore. The difficulty pending between manufacturers and labor, and the recent failure of Marshall & Co., have combined to revive the feeling that prices may yet decline below present figures, which has greatly impaired business, even in small orders, and greatly depressed the prospects of trade in the near future. Prices are feverish, but there is no direct indication that a decline is imminent. Should the proposal of closing the mills become a reality, there is more probability of prices advancing. Some of the mills have stated positively that they will not accept orders for delivery beyond the 1st of June, and are very chary in regard to those for even a shorter time. Prices continue pretty firm within the following quotations: From the mills, \$2.10 @ \$2.25 for Refined and \$2 for Common; from store, \$2.40 @ \$2.50 for Refined and \$2.20 @ \$2.30 for Common.

Steel Rails.—We note a general inquiry, but do not hear of any important sales since our last. We quote \$38 at mill for future delivery.

Old Rails.—There is nothing of importance to report in the way of sales, which have been few and small. We quote, nominally, \$23 @ \$24 for T's. The supply here now and to be thrown on the market is large.

Scrap Iron.—The market for this class of iron is very dull. Dealers do not have an opportunity of doing business, as there are no buyers in the market for Yard Scrap. The stock is not very plentiful, but what they get is being culled and piled up, for which present prices would be entirely unsatisfactory. We continue to quote No. 1 Wrought at \$26 @ \$27, ex-store at \$25.50, ex-ship at \$25, and Scrap Ends at \$22 @ \$23.

METALS.

Copper.—Sales for the week sum up 200,000 lb., and no more. We quote Lake Superior, 15 1/2¢ @ 16¢, and other brands 14 1/2¢ @ 15¢. The market has not yet found its level, and is now to a great extent, if not altogether, dependent on that of London. Up to last night there was no change in the market there. This afternoon we are cabled from there to the following effect: "Market not so steady as at last report, and prices lower. Best Selected, £69.10 @ £69.15, and Chili Bars, £63.10 @ £64." No official change has yet been made in the combination prices of manufacturers. They remain: Bottoms, 31¢ @ 32¢; Braziers, 30¢ @ 31¢; Circles, 33¢ @ 34¢; Sheathing, 28¢, and Bolt Copper, 30¢; Segment Sheets, 33¢; Fire-Box do., 30¢. Considerable shading from these rates is said to be going on, but to what extent it is not easy to ascertain.

Tin.—Our market has relaxed into quite an apathetic condition, so that, with the light dealings going on and the little consumptive demand existing, we cannot quote Straits Tin, large lines, any better than 21¢, and L. & F. barely 22¢. Shipments from the Straits settlements to the United States during the first half of April have not exceeded 200 tons, while to England nothing was shipped. Messrs. William I. Russell & Co., 12 Cliff street, New York, made the visible supply on this coast, 14th inst., 3319 tons, against 3546 a year ago, and the price of Straits, 20 1/2¢, against 23¢ last year, 20 1/2¢ in 1881, 19 1/2¢ in 1880 and 14 1/2¢ in 1879. London cabled Straits Tin last night 29.5. 10/1. To-day we are in receipt from there of the ensuing cable message: "Market a little steadier. Straits Ingots, spot, £95.10 @ £96, and futures, £96.10 @ £97." Tin Plates have been steady during the week under review, without any material change in values. We quote large lines, ordinary brands, 7 box: Charcoal Bright, \$5.87 1/2 @ \$6.25; do. Ternes, \$5.25 @ \$5.37 1/2; Coke Tin, \$5.12 1/2 @ \$5.25; and do. Ternes, \$4.87 1/2 @ \$5.12 1/2. Liverpool is a shade easier; cabled last night Coke Tin 15/9 @ 16/1, and Charcoal 18/6 @ 20/1. To-day we hear from London that the market is weak.

Lead.—There has been nothing done during the week but an absolute jobbing trade, the price of Common Domestic running up as high as 4 1/2¢. The fact is that there is no more low-priced Lead for sale, and this accounts for the rebound, which has not occurred from free buying, and may be called rather a negative than a positive advance. At St. Louis, on the other hand, there has been a fair amount of activity, 300 tons sold at \$4.20 @ \$4.25, and 200 tons Chemical and Common at \$4.10 @ \$4.12 1/2, to which a freight of 4 1/2¢ would have to be added this way. At the close the market here stands very dull, without wholesale offers at all—in fact with a mere jobbing demand at \$4.60 @ \$4.65. Meanwhile 200 tons Germania arrived per Cassandra Adams in 94 days around Cape Horn, for which \$4.45 was offered in vain, and the lot went into store; 500 tons more are expected and due every day. The market for Common Lead closes firm, and may reach

\$4.65 @ \$4.70 before this week comes to a close. Refined is nominally worth as much as Common, and no more. From London we receive this afternoon the following cablegram: "Market quiet at unchanged prices. Common English Pig, £13.5 @ £13.10/11. Manufactures are quoted as follows: Lead Pipe, 6 1/2¢; Sheet Lead, 7 1/2¢; Tin-lined Lead Pipe, 15¢ @ 16¢, and Block-tin Pipe, 45¢, less the usual discount to dealers.

Spelter and Zinc.—No life has as yet got into the market for Common Domestic Spelter, which remains in an expectant, but firm, attitude at \$4.75 @ \$4.85; Silesian we nominally quote 5 1/2¢ @ 5 1/4¢. We are wired from London as follows to-day: "Spelter is quiet and unchanged. Ordinary at shipping ports, £15.5 @ £15.10/11." We quote Bertha Refined 8 1/2¢, and Bergengort 9 1/2¢, while Sheet Zinc is moderately active at 6 1/2¢.

Antimony.—Has been featureless and devoid of life at 10¢ for Hallett and 11¢ for Cookson.

FOREIGN TRADE MOVEMENTS.

The following is a summary of foreign trade movements during the past week:

	1881.	1882.	1883.
Total.....	\$865,231	\$12,099,416	\$6,604,480
Prev. reported.....	114,979,709	137,217,566	127,468,635
Since Jan. 1.....	\$121,634,940	\$149,310,282	\$137,071,315

Included in the imports were articles of merchandise valued as follows:

	Pkgs.	Value.
Antimony.....	49	\$2,879
Brass goods.....	141	73,313
Bronzes.....	7	1,120
Chains and anchors.....	15	561
Clocks.....	13	1,451
Copper.....	1	7,078
Cutlery.....	169	58,994
Iron, hoop, tons.....	32	880
Hardware.....	32	580
Iron, pig, tons.....	1,343	36,636
Iron, sheet, tons.....	14	1,095
Iron, other, tons.....	370	1,001
Iron cotton ties.....	2,200	1,848
Lead, pig, tons.....	787	25,991
Lead, sheet, tons.....	9/9	3,850
Machinery.....	303	23,008
Metal goods.....	366	99,207
Nails.....	170	659
Needles.....	20	6,465
Old metal.....	5	5,095
Ore.....	52	323
Platina.....	359	3,777
Platedware.....	1	5
Plumbago.....	237	3,270
Perforated caps.....	18	2,813
Perforated caps.....	18	2,813
Quicksilver.....	3	13,046
Saddlery.....	12	1,125
Steel.....	49,514	95,455
Tin, boxes.....	18,509	53,527
Tin, 5,686 slabs, 447,000 lbs.....	9,075,808	9,075,808
Wire.....	440	2,227

The quantity of various articles imported compares with previous weeks as follows:

	For the 15 weeks week of 1883.	Same week of 1882.
Cutlery, pkgs.....	190	2,212
Hardware, pkgs.....	32	359
Iron, pig, tons.....	1,343	44,848
Lead, pig, tons.....	999	1,072
Steel, pkgs.....	49,514	780,844
Tin, boxes.....	18,509	53,527
Tin, slabs, lbs.....	447,000	6,339,070

EXPORTS OF SPECIE.

For the week ended April 14:

Total.....	\$973,053
Previously reported.....	4,940,334

Total since January 1, 1883.....	\$5,241,387
Same time in 1882.....	14,409,253
Same time in 1881.....	3,730,588
Same time in 1880.....	3,068,897
Same time in 1879.....	6,380,648
Same time in 1878.....	5,400,921
Same time in 1877.....	4,595,894
Same time in 1876.....	15,220,852
Same time in 1875.....	11,857,864
Same time in 1874.....	9,075,808
Same time in 1873.....	17,204,512
Same time in 1872.....	7,509,670

EXPORTS EXCLUSIVE OF SPECIE.

For the week ending April 17:

Total.....	\$6,520,451
Previously reported.....	\$5,206,130
Prev. reported.....	107,145,924
Since Jan. 1.....	\$113,666,375

Since Jan. 1.....\$113,666,375 \$94,184,370 \$106,100,917

COAL.

The Anthracite Coal trade continues in the same dull and featureless condition noted for some time past, and, with full time at the mines through the coming week, prices do not promise an immediate improvement. The producers, however, are expecting a new impulse on the reopening of navigation by canal, May 1st. They express a belief that about all the Coal now brought to tidewater is taken up, which would imply a fair business in progress.

Eastern trade remains quiet, with freights to Boston \$1; to Providence, 70¢ @ 75¢.

Bituminous is as dull as ever, with quotations for Cumberland, nominally, \$4.50 @ \$4.60 alongside in New York. The New Central Coal Company has renewed its contracts with the New York Central and Harlem Railroad.

The Pottsville Miners' Journal says: "There is no diminution in the inquiry for iron, but the prices offered are not such as to induce the Iron men to do more than keep their fires alive. As yet there has been no stoppage, except of such furnaces as were compelled to make repairs, but it will require a better business than is at present offered to keep them going for any considerable period. The stoppage of furnaces would, of course, still further depress the Coal demand, and hence the condition of the Iron trade is a matter of some considerable anxiety to Coal operators."

The total product of Anthracite last week was 382,736 tons, against 399,578 tons for the same week of last year, and the product for the year so far is 7,622,031 tons, an increase of 745,642 tons.

The Delaware and Hudson Canal is now open.

OLD METALS, PAPER STOCK, &c.

The purchasing prices offered by dealers are as follows:

Copper, heavy.....	\$.13 1/2 @ .14
light.....	.12 @ .12 1/2
Copper Bottoms.....	.12 @ .12 1/2
Yellow Metal.....	.09 @ .09 1/2
Brass, heavy.....	.10 @ .10 1/2
Composition, heavy.....	.13 1/2 @ .14
Lead, heavy.....	.03 1/2 @ .03 3/4

Zinc Lead.....	.03 1/2 @ .03 3/4
Pewter, No. 1.....	.14 @ .15
Pewter, No. 2.....	.10 @ .11
Wrought Iron.....	22.50 @ 23.00
Light.....	12.00 @ 13.00
Stove Plates.....	12.00 @ 13.00
Machinery do.....	15.00 @ 16.00
Grate Bars.....	4.50 @ 5.00
Electrotype Plates.....	.04 @ .04 1/2
Stereotype Plates.....	.05 @ .05 1/2
Small type.....	.05 @ .05 1/2

The prices current (prices paid by local dealers) for Rags, &c., are as follows:

Canvas, Linen.....	3 1/2 @ 4 c.
White Cotton, New.....	3 1/2 @ 4 c.
No. 2.....	2 1/2 @ 3 c.
White, No. 1.....	4 c. @ 4 1/2 c.
No. 2.....	2 c. @ 2 1/2 c.
Soft Woollens.....	6 c. @ 7 c.
Mixed Rags.....	1 1/2 @ 2 c.
Gunny Bagging.....	1 1/2 @ 1 3/4 c.
Book Stock.....	1 1/2 @ 2 c.
Newspapers.....	1 c. @ 1 1/2 c.
Waste Paper and Scraps.....	1 c. @ 1 1/2 c.
Kentucky Bale Rope.....	3 1/2 @ 4 c.

IMPORTS

Of Hardware, Iron, Steel and Metals into the Port of New York, for the Week ending April 18, 1883.

Belcher H. W. Co.	Pig, tons, 600
Wood, Nibaur & Co.	Wire rods, pkgs., 2,145
Wire rings, 5'4	
Order.....	
Pig, tons, 1162	
Ore, tons, 1179	
Ore, kg., 508,200	
Bars, 855	
Rail ends, tons, 280	
Cotton ties, bbls., 1220	
Rail ends, lot	
Spiegel for Canada, tons, 511	
Channel and angle, pcs., 373	
Spiegel, cks., 300	
Spiegel, tons, 20	
Wire rods, bbls., 26,394	
Wire, coils, 375	
Rails, 501	
Coiled rods, bbls., 3557	
Spiegel, cks., 180	
Railroad bars, 4449	
Fish plates, 8508	

Steel.

Abbott Jere & Co.	Cases, 80
Bar, 1	
Baring Bros. & Co.	Rails, tons, 233
Brown Wm.	Cases, 8
Brown Bros. & Co.	Wire, rings, 2400
Belcher H. W. Co.	Cases, 15
Bundies, 8	
Broomfield, Geo.	Ag. imp. pkgs, 245,875
Bundies, 87	
Hartley & Graham.	Wire, bbls., 168
Moore, J. P.	Wire rods, bbls., 2630
Dodge A. Co.	Wire, cks., 2
Duval H. R.	Bars, 20
Bars, 20	
Bundies, 10	
Hermann Theo.	Bars, cks., 3
Mayer, Strouse & Co.	Bars, 15
Moss F. W.	Bundies, 316
Bars, 78	
Phos. Dodge & Co.	Bundies, 15
Bars, 72	
Temple & Lockwood.	Cases, 20
Bundies, 104	
Wagner W. F. Co.	Cases, 31
Cases, 31	
Bundies, 308	
Bars, 106	
Cases, 6	
Wells Fargo & Co.	Plates, case, 1
Order.....	
Bars, 15	
Axles & whls, 4	
Ag. imp. pkgs, 297	
Clocks, pkgs., 2	
Mach'y, pkgs., 3	
Bars, 208	
Wire rods, 673	
Galv. rods, cks., 40	
Bars, 208	
Forgings, 34	
Forgings, 28	
Bundies for Canada, 1077	
Hoops, bbls. for Canada, 70	

Metals.

Merch. Disp. Co.	Black taggers, 380
Montgomery & Co.	Antimony, cks., 34
Wire, case, 9	Scoville Mfg. Co.
Naylor, Benson & Co.	Mide, cs., 12
Old copper, cks., 2	Pig, tons, 200
Lead, pkgs., 1519	Lundberg Gust.
Tin slabs, 5011	Met. goods, bxs., 2
Zinc oxide, bbls., 253	Ter

PHILADELPHIA.

Office of The Iron Age, 200 South Fourth St., Philadelphia, April 17, 1883.

Pig Iron.—The market has been dull and heavy during the week, and although prices are nominally unchanged, buyers find the tendency in their favor. This crops out more particularly when there seems to be a chance of a large order, and in such cases, prices 50 cents to a dollar below the general market are frequently reported. In fact, the prominent feature in the trade at the moment is superabundance. It makes very little matter how much or how little a buyer may require, sellers are anxious to double the quantity, and although the volume of business is by no means insignificant, the feeling could hardly be duller than it now is. Too much Pig Iron is the great difficulty, and until that is adjusted prices cannot be other than weak and unsatisfactory. Furnace proprietors recognize this, but they are not quite so unanimous in regard to who should continue and who should "blow out." The problem has to be solved, however, and if it is going to be a question of survival of the fittest, it may be months before the market settles down to firm quotations. At the moment the outlook is most discouraging, and so far as can be seen, there is nothing in the immediate future to warrant any prediction of improvement. Sales during the week have been made on the following basis for furnace deliveries: No. 1 Foundry, \$22 @ \$23.50; No. 2 Foundry, \$20 @ \$21; Gray Forge, \$18.50 @ \$21. Market feverish, irregular and unsettled.

Bessemer Pig.—There is some little movement among consumers and a probability that business will be closed within a few days. Sellers quote \$22 somewhat firmly, with \$21 @ 21.50 bid.

Spiegel Eisen.—There are several inquiries on the market, but the higher prices asked seem to check business. Sales were made a few days ago at a trifle over \$32.50, but \$33 is the usual asking rate for 20 %.

Muck Bars.—There is more inquiry, and a considerable business is being done at \$35 @ \$35.50 at mill. Sellers are firm at the above quotations.

Blooms.—Market quiet and easy, but without change in quotations, which are as follows: Charcoal Blooms, \$63 @ \$65; Run-out Anthracite, \$55 @ \$57; Scrap Blooms, \$48 @ \$50; Northern Ore Blooms, \$45 @ \$47.50.

Bar Iron.—The market continues in much the same condition as heretofore reported, viz., dull, weak and irregular. The usual monthly meeting of the Philadelphia ironmasters was held yesterday, but no change was made in the card rate. Labor will therefore be paid on the basis of 2.3¢, which is also the nominal selling rate, although very little business can be done at that price. Sales are reported at rates varying all the way from 2.15¢ to 2.25¢, but 2.2¢ @ 2.25¢ is probably nearer the market than any other quotations. Anything below 2.2¢ is not supposed to be up to the standard of Refined Iron, while only very small lots can be sold at over 2.25¢. The past week has not developed any material change in the position—certainly it has not been improved. There have been a few orders for specialties, but, on the whole, the market is slow and prices very unsatisfactory.

Plate and Tank Iron.—There has been more activity during the past week, and several orders which have been held in abeyance have at last been placed. Prices have been very low, however, including Boat Plate at 2.35¢, and Tank Iron at 2.4¢, but the lots were of some importance, say 1000 tons of the former and 300 or 400 of the latter. In the usual course of business, manufacturers ask a tenth to three-tenths more money, but when a good-sized order can be offered, buyers are reasonably certain to get concessions of more or less importance. The mills have improved their position during the week, however, so that prices are comparatively firm at 2.4¢ @ 2.5¢ for Boat Plate; Tank Iron and Bridge Plate, 3.3¢ @ 3.4¢ for Shell Iron and 4.25¢ @ 4.5¢ for Flange Iron, with a fair demand.

Structural Iron.—The market is not very active, although a few good-sized orders have been placed. Prices have not been maintained, however, and although Angles are quoted at 2.5¢, orders have been taken at concessions of a tenth or more. Some of the mills are comfortably situated as regards work and others are slack; hence the chance of better prices is not very encouraging. Quotations are about as follows: Angles, 2.5¢; T's, 3.2¢; Beams and Channels, 3.5¢.

Sheet Iron.—There is more inquiry, and the indications of business near at hand are gradually improving. Buyers' ideas of prices are very low, however, and it is difficult to adjust values on a basis to meet the views of both parties. Some pretty large orders have been entered, however, and manufacturers appear to be of the opinion that prices have reached bottom for the present. Small lots are quoted about as follows:

Common Sheets, No. 28..... 15¢
Common Sheets, Nos. 26 and 27..... 14¢
Common Sheets, No. 25 to 23..... 13¢
Common Sheets, No. 16 to 21..... 12¢
Best Refined, 1/4 advance on the above..... 61¢
Best Bloom Sheets, No. 24 to 25..... 61¢
Best Bloom Sheets, No. 16 to 21..... 61¢
Common Red Plates, 3-16 to 16..... 3-16
Blue Annealed, 3-16 to 16..... 3-16
Best Bloom, Galvanized, discount..... 40¢
Second quality, discount..... 30¢

Wrought Iron Pipe.—Business has improved somewhat during the past few days, but the market is far from active. There is said to be more inquiry in the market than a week ago and a fair business is anticipated. Prices, however, are unimproved. We repeat last week's quotations, viz.: Boiler Tubes 60¢ and Gas and Steam Pipe about 70¢ discount. On desirable specifications further discounts would probably be conceded.

Steel Rails.—There has been more business during, especially at Western mills, but there is no improvement in prices. Sales to the extent of about 30,000 tons have been made at prices varying from \$38 to \$39 at mill, the latter being a pretty firm quotation for summer deliveries. For later deliveries prices can be shaded, but there is no great disposition to buy in advance of requirements. Light Rails are in active demand at prices varying from \$40 to \$43 at mill, according to

weight and pattern of Rail. Street Rails are in active demand, with sales of nearly 1000 tons at \$46, New York delivery.

Crop Ends.—There is more demand, and buyers can easily be found at \$22, Atlantic ports, but sellers are very firm at \$22.25 @ \$22.50, according to delivery. Latest transactions were at \$22.25; market firm.

Old Rails.—A sale of several hundred tons was made to-day at \$23.50 on wharf, Baltimore, with further inquiries at about same figures. Holders are firm at \$23.50 @ \$24 for T's, and \$27.50 @ \$28 for Double Heads, with prospects of greater activity than there has been for some time. Spot lots T's would command \$25 in small quantities.

Scrap Iron.—There is a fair demand, but prices are fairly maintained. Sales have been made at \$26 @ \$27 for selected yard lots, and \$25 @ \$25.50 for foreign, but buyers are very careful in selections.

Nails.—Continue in fair request, but prices are weak at \$3.15 per keg in an ordinary way.

PITTSBURGH.

Office of The Iron Age, 77 Fourth Avenue, Pittsburgh, Pa., April 17, 1883.

The Iron situation has not improved since the date of our last report; on the contrary, the outlook is not as bright as it was a week ago. About the only encouraging feature to note is the more seasonable weather, which has revived the growing crops, and the prospect for a good harvest is more promising. But little progress has been made toward bringing about a settlement of the vexed labor question. Conference committees of the iron manufacturers and the Amalgamated Association had a protracted session on Saturday with closed doors, but it is known that nothing was effected. The manufacturers will insist on a reduction of the sliding scale to 2¢, which, of course, for a time will be opposed by the Amalgamated Association. Apprehensions of a strike are entertained, but it is to be hoped that wise counsels will prevail, as a strike in the present condition of affairs would be a calamity here in Pittsburgh. As it is, with the mills all in operation, general business is dull; there are a great many people out of employment, and with the mills shut down and thousands of people thereby deprived of obtaining the ordinary means of subsistence, the effect could not be otherwise than disastrous.

The assignment of the well-known foundry firm of James Marshall & Co., whose liabilities are large—variously estimated at from \$500,000 up to \$1,500,000—while not altogether unexpected, is having a most depressing effect, by unsettling confidence, and it is feared that this failure may be followed by others. The Iron trade of Pittsburgh never, perhaps, was in a more healthy condition financially, but there are always some weak firms who, in a time like the present, are pretty sure to go under.

Ore.—This important interest continues in a very unsettled condition, and there is not much prospect of any immediate improvement. Representatives are here almost daily from the Lake Superior Ore region, very anxious to contract, but furnacemen are still refusing to buy beyond their immediate actual wants. Prices are weak, and it is expected will go still lower, although some companies say that rather than make any further concessions they will stop mining. It is expected that Pittsburgh furnaces will be enabled within the next year or two to draw the most of their supplies from new Ore fields much nearer home.

Pig Iron.—The depression noted a couple of weeks past continues; the demand, instead of improving, as hoped for and expected, is falling off, and prices continue weak. Consumers, owing to the probability of a further decline, and the unsettled state of the labor question, are refusing to anticipate future wants. Moreover, it is claimed that Marshall & Co., whose failure is noted above, hold some 50,000 tons on speculation, the great proportion of which is in possession of the banks as collateral, and fears are entertained that a good deal of this iron will be thrown upon the market and sold to the highest bidder. It looks at present as if a good many of the furnaces in operation would be compelled to blow out as soon as they have got through with existing contracts. We quote as follows:

No. 1 Foundry..... \$22.00 @ 22.50, 4 mos.
No. 2..... 22.00 @ 21.00, 4 "
No. 3..... 18.50 @ 19.50, 4 "
Gray Forge Neutral..... 18.50 @ 19.50, 4 "
All-Ore Forge..... 20.00 @ 21.00, 4 "
Bessemer Iron..... 22.50 @ 23.00, 4 "
Cold-Blast Charcoal..... 30.00 @ 35.00, 4 "

Muck Bar.—There has been some inquiry during the past week, and no sellers to be found at our inside quotation of last week, although the last sale reported was at the price in question—\$33.50, cash, at mill. We now quote at \$34 @ \$35, cash, at mill, and the inside quotation appears to be bottom for a good, strong Neutral mixture.

Manufactured Iron.—Trade continues very unsettled and unsatisfactory. The demand is light—considerably short of what it usually is at this time, and prices are unremunerative. Large buyers are still holding back, or buying only as immediate necessities require, in anticipation of still lower prices, and although the only encouraging feature to note is that stocks in hands of jobbers and consumers are unusually light. Prices are still quoted on a basis of 1.90¢ @ 2¢, 60 days, for Merchant Bars, with usual discount of 2 % for cash.

Nails.—There is a fair degree of activity; business is all that can be expected, although the demand is mainly for small lots. Large buyers still have an idea that prices will be lower; hence they are buying sparingly, but makers report that for the time they have all they can do. Prices remain about as quoted in last report—\$3.10 @ \$3.15, in a jobbing way, and \$3, net cash, for carload lots and upward. The card remains unchanged, but, as noted, selling prices are considerably below the card.

Wrought Iron Pipe.—Manufacturers continue to report trade as being very unsatisfactory; the complaint is not so much a lack of business as unremunerative prices. The mills, so far as we can learn, are pretty well supplied with orders, but it appears im-

possible to get prices up. Discounts on Gas and Steam Pipe, 70 and 5 % @ 70 and 10 %; on Boiler Tubes, 55 % @ 57 1/2 % off.

Old Rails.—It is rumored that sales of American T's have been made during the past week as low as \$25.50, but brokers who make a specialty of the same inform us that they cannot put them here from any point under \$26—that is, for immediate delivery—and we continue to quote the latter as the ruling price.

Steel Rails.—Heavy Sections are quotable at \$39 @ \$39.50, and \$40, cash, at mill, for near-by delivery, and 50¢ @ \$1 per ton less for late summer or fall delivery. Mills here have no complaint to make, so far as orders are concerned, but they say that prices leave very little profit.

Railway Track Supplies.—There is a fair degree of activity at unchanged prices. Spikes, 2.60¢, 30 days; Splice Bars, 2¢; Track Bolts, 3.25¢ with Square and 3.35¢ @ 3.40¢ with Hexagon Nuts.

Crop Ends.—No sales reported during the past week, in the absence of which we continue to quote at \$25 @ \$25.50 per gross ton. The last sale of Bloom Ends was at \$25.

Steel.—The Merchant Steel trade continues backward for the season, with no change in list prices. There is always more or less cutting.

Scrap.—The dullness noted for some time past continues, and there is so little doing that it is difficult to give reliable quotations. No. 1 Wrought is quoted at \$24 @ \$25 per net ton for Ordinary, and \$26 @ \$27 for Selected; Wrought Turnings, \$17 @ \$19; Old Car Wheels, \$22 @ \$22.50, gross; Car Axles, \$33 @ \$35, net ton; Cast Borings, \$13 @ \$14, gross.

Coke.—Business continues slow, in sympathy with the depression in the Iron trade, with but little prospect of any immediate improvement. The Pennsylvania Railroad has reduced freight on Coke 17¢ per ton, all of which will go to the consumer, as makers have made no change in price—\$1.05 per ton, free on cars at ovens.

Window Glass.—This important Pittsburgh interest continues in a very unsatisfactory condition, but hopes of a change soon for the better are entertained.

CHICAGO.

Office of The Iron Age, 36 and 38 Clark St., cor. Lake, Chicago, April 16, 1883.

Hardware.—Trade in both Shelf and Heavy Hardware during the past week has been good, and the present week opens with the prospect of still further improvement, with quotations remaining firm.

Nails.—The demand for Nails has been good. Some few sizes are reported somewhat scarce; orders are, however, being filled without any great difficulty. We quote rod to 60d., \$3.30 @ \$3.40 per keg, with the usual discount off for cash. These quotations are, however, shaded in many instances.

Manufactured Iron.—The demand for Merchant Iron continues as previously reported (good), while quotations on Common Bar, as on Nails, are being shaded below those given, and which are as follows: Bar Iron, 2.30¢ @ 2.40¢ rates; Angle Iron, 3.10¢ @ 3.20¢ rates; T Iron, 4¢ rates; Beams, 3.80¢; Channels, 3¢; Tank Iron, 3¢ @ 3.20¢ rates; Sheet Iron, 3.20¢ @ 3.40¢ rates; Norway Original Bars, 4 1/2¢ rates; Norway Re-rolled Bars, 5 1/2¢ rates; Ulster, 4 1/2¢ rates; Low Moor Iron, 8¢ rates; Nuts and Washers, 8¢ off list; Wrought Boat Spikes, 3 1/4¢ rates. Otherwise we have no change to note.

Pig Iron.—As reported in our last, the market had a quiet tendency, but it is now reported as being actually dull, the supposition being that consumers are at present pretty well stocked up, or, as a prominent dealer stated, find themselves with but few orders on hand and few new ones being entered on their books. We have no change to note in prices and quote as follows: Lake Superior Charcoal, for Nos. 1 and 2, \$24; No. 3, \$25, and Nos. 4, 5 and 6, \$25, 4 mos.; Briar Hill, \$25; Silvery Soft, \$23 @ \$24; Crane No. 1, \$27.50; No. 2, \$26.50; Himrod, \$24; Thomas, \$27.50 @ \$28; American Scotch, \$24 @ \$25; Du Val, No. 1, \$24; No. 2, \$23; Fulton Notch, No. 2, \$22.50; No. 3, \$21.50. Southern Coke, \$24.25. Calumet, \$23 @ \$23.50, 4 mos., and Imported Scotch, \$31.

Steel.—Continues unchanged from our previous report; quotations remain somewhat unsettled and demand continues fair. We quote as follows: Tool, 12¢; Machinery O. H., 5¢; Crucible Machinery, 7¢; Hammer, 2 inches and under, 8¢; over 2 inches, 9¢; Cast Spring, 6¢, and O. H. Spring, Tire and Sleigh Shoe, 5¢; Sheet, first, second and third quality, 12¢, 10 1/2¢ and 8 1/2¢ respectively; Crucible Plow, 6¢; Eagle Plow, 5¢; Iron Center Plow, 9 1/4¢, and Soft Steel Center Plow, 9 1/4¢; Cast Plow, 5¢; German Plow, 4 1/2¢.

Scrap Iron.—The movement in Scrap Iron still continues slight, with a dull market. The following are the purchasing prices paid by dealers: No. 1 Railroad Wrought Scrap, per net ton, \$21; No. 1 Country Wrought Scrap, per net ton, \$19; No. 1 Cast Scrap, per net ton, \$17; No. 1 Stove Plate Scrap, per net ton, \$11; Machine Shop Wrought Turnings, per ton, \$10; Cast Iron Borings, \$7; Old Plows and Plow Steel, \$13.

CHATTANOOGA.

Office of The Iron Age, Market and 8th Sts., Chattanooga, April 16, 1883.

The extremely warm weather of the past week has conducted more to development of vegetation than it has to stimulate energy in trade and production. General business continues on the same rather slow gait it assumed early in the year. There is some slight improvement perceptible in builders' materials, but no other articles show any difference for better or worse.

Pig Iron.—There is nothing in the market beyond the old story of slow and cautious movement. Buyers still confine their purchases to immediate wants. Quotations are difficult if accuracy is desirable, many holders of low grades selling at what they can get. We quote: No. 1 Foundry, \$22 @ \$23; No. 2 Foundry, \$20 @ \$21; Gray Forge, \$18 @ \$19; White and Mottled, \$16 @ \$18; Car-wheel Metal, \$28 @ \$30.

Ores.—We quote: 50 % Brown Hematite, per ton, \$2 @ \$2.75; Red Fossil, \$2 @ \$2.25, delivered at furnace.

Miscellaneous Articles.—Old Rails are very slow. We hear of a lot being placed at \$23. We quote Wrought Scrap, \$18 @ \$22; Cast Scrap, \$11 @ \$14; Old Wheels, nominal, \$24.

Nails.—We quote at \$3.30, and not particularly active.

Manufactured Iron.—We quote Bar at \$2.20, carload lots. Mills are running very slow. Railroad Spikes, \$3.20; Track Bolts, \$3.75; Fish Plate, \$2.50.

Coal.—We quote: Fancy Lump, \$3; Common, \$3 @ \$2.50; run of mine to manufacturers, \$2.

Coke.—We quote: Furnace Coke, \$3 at point of consumption; Foundry, 10¢ @ 12¢ per bushel.

Steel and Iron Rails.—Steel Bars, \$40 at mills in Pennsylvania. Iron Rails are out of market. No demand for them.

CINCINNATI.

APRIL 16, 1883.—**Pig Iron.**—The market has been fairly active during the past week, without developing either weakness or strength in prices in following quotations: Best No. 1 Hanging Rock Charcoal Foundry..... \$25.50 @ \$26.00
Good..... 25.00 @ 25.50
Tenn. and other Southern brands..... 22.00 @ 22.50
No. 2, 5¢ @ \$1 less.
No. 1 Hanging Rock Coke..... 22.00 @ 21.00
Southern..... 21.00 @ 21.50
No. 2, 1¢ less.
American Scotch No. 1..... 22.00 @ 22.50
No. 2, 1¢ less.
Silver-Gray Softeners, No. 1..... 21.50 @ 22.00
No. 2..... 20.00 @ 20.50
Forge, for the range of grades and sizes..... 18.00 @ 23.50
Cold Blast, Car-wheel kinds..... 28.00 @ 31.00
Warm Blast..... 25.00 @ 27.00
Scrap Iron, Cast..... .50 @ .90
" Wrought..... .90 @ 1.30
" Rails..... 23.00 @ 25.00
" Car Wheels, per lb..... .01 @ .02

Bar Iron, \$2.60 card rate; concessions of from 1-10¢ to 4-10¢ on orders for desirable sizes. Nails, \$3 to the trade, 500 kegs or more; car lots, \$3.10; less than car lots, 2-10¢ @ 4-10¢ more. Market active.

ST. LOUIS.

HOFFER & Co., Pig Iron and Iron Ore Merchants, 417 Pine street, report to us as follows, under date of April 14, 1883: Iron has declined somewhat since our last report, and but little is being sold. Quotations are:

HOT BLAST CHARCOAL IRONS.
Missouri..... \$21.00 @ 22.00
Southern..... 22.00 @ 23.00
Ohio..... 27.00 @ 28.00
COAL AND COKE IRONS.
Missouri..... \$21.00 @ 22.00
Southern..... 20.00 @ 22.00
Ohio..... 21.00 @ 26.00
MILL IRONS.
Red Short..... \$10.00 @ 21.00
Neutral..... 18.00 @ 20.00
CAR WHEEL AND MALLEABLE IRONS.
Missouri..... \$23.00 @ 24.00
Southern..... 25.00 @ 30.00
Ohio..... 25.00 @ 35.00

LOUISVILLE.

GEO. H. HULL & Co., Commission Merchants, report to us as follows, under date of April 14, 1883: The market is quiet. Buyers are purchasing only what they need for immediate use. We quote for cash, in round lots, as follows:

FOUNDRY IRON.
No. 1 Hanging Rock Charcoal..... \$25.00 @ 26.00
No. 1 Southern Charcoal..... 22.50 @ 23.50
No. 1 Hanging Rock Stonecoal and Coke..... 22.00 @ 22.50
No. 1 Southern Stonecoal and Coke..... 20.50 @ 21.00
" American Scotch..... 20.00 @ 21.00
Open Silver-Gray..... 19.50 @ 20.00
Close Silver-Gray..... 19.00 @ 19.50
MILL IRONS.
No. 1 Charcoal..... 20.00 @ 21.00
No. 1 Stonecoal and Coke, Neutral..... 19.50 @ 20.00
No. 2 Stonecoal and Coke, Neutral..... 18.50 @ 19.00
No. 1 Stonecoal and Coke, Cold-short..... 18.00 @ 18.50
No. 2 Stonecoal and Coke, Cold-short..... 17.50 @ 18.00
White and Mottled, Cold-short and Neutral..... 17.00 @ 18.00
CAR WHEEL IRONS.
Hanging Rock, Cold-blast..... 32.00 @ 35.00
Hanging Rock, Warm-blast..... 25.00 @ 27.00
Alabama and Georgia, Warm and Cold-blast..... 26.00 @ 28.00
Central Kentucky, Cold-blast..... 26.00 @ 28.00

W. B. BELKNAP & Co., Iron and Steel Merchants, Nos. 115 to 121 West Main street, report to us as follows, under date of April 14, 1883: The market presents few new noteworthy features. While prices are admitted on all sides to be abnormally low, there is no improvement to note on Bar Iron at least. Supply seems ample and demand only moderate. Sheet, however, is evidently reacting from the extreme figures obtainable in February and early March. Some mills claim to be sold up to their full capacity for 60 days, and are not soliciting further specifications. An advance of \$2 per ton may be quoted. In event of a general closing down in June, this class of Iron would advance most rapidly, as it is always most sensitive on account of the limited production. Were it not for the high freights ruling, many Western orders would find their way to Eastern mills. Hoops and Bands are still dull. Nails are arriving in fair quantities and selling freely at reduced figures. The manufacturers' card is now nominal, and seems at the meetings to be passed, like the compliments of the day, simply as a matter of course. Horseshoes have declined, consequent on receipt of circulars from the manufacturers. To the mill prices, \$4.25 for Horse, add freights, and the price for this market will be the result. No article in the trade probably is sold on as close margin as Horseshoes. As leaders, they certainly take the heat of the tandem. Barbed Wire is much cut in price; the unlicensed is offering at special bargains, but few parties wish to buy even the possibility of a lawsuit. From winter temperature the mercury has bounded into the 80's, and vegetation is responding. A few days of this weather will show up the winter wheat in its true proportions.

RICHMOND.

ASA SNYDER, Iron Merchant and Furnace Agent, writes as follows, under date of April 16, 1883: A good business is prevailing in all our Iron industries, and, in consequence, the consumption of Pig and Scrap

Iron is large; still, both of the latter items are weak and declining. Production is now in excess of consumption, and so depresses the market. We quote as below:

No. 1 Scotch Pig Iron..... \$24.00 @ 25.50
No. 1 Anthracite Pig Iron..... 24.00 @ 25.00
No. 2..... 22.00 @ 23.50
No. 1 Virginia Coke Pig Iron..... 23.00 @ 23.50
No. 2..... 21.00 @ 21.50
No. 1..... 19.50 @ 20.50
White and Mottled..... 19.50 @ 20.00
Virginia C. B. Charcoal..... 27.00 @ 29.00
Old Dom. Nails (carload lots)..... 3.40 @ 3.50
Old Wheels..... 23.00 @ 24.00
Wrought Scrap, No. 1..... 18.00 @ 22.00
Cast Scrap, No. 1..... 18.00 @ 19.00
Richmond Refined Bar Iron..... 2-10¢ base.
Horse Shoes (Tredgair)..... 4.50 @ 5.00
Mule..... 5.50 @ 6.00

BALTIMORE.

W. N. WYETH, Iron and Steel Merchant, 46 and 48 South Charles street, reports us the following, under date of April 16, 1883: Trade continues ruling in about the same groove as for some time reported—that is, quiet and disappointing for the reason. Values remain notably unchanged, but favoring purchaser:

Ref. Bar Iron, 1 to 6 x 3/4 to 1..... 2 1/2¢ @ 2 3/4¢
" 1 to 4 1/2 x 1 1/2 to 1..... 2 1/2¢ @ 2 3/4¢
" 1/2 to 1, Round..... 2 1/2¢ @ 2 3/4¢
Hoop Iron, 1 1/2 wide and upward..... 3 1/2¢ @ 3 3/4¢
Rand Iron, from 1 1/2 to 6 in. wide..... 2 7/8¢ @ 2 9/8¢
Horse-shoe Iron..... 3 1/4¢ @ 3 1/2¢
Norway Nail Rods..... 3 1/4¢ @ 3 1/2¢
Black Diamond Cast..... 5 1/4¢ @ 5 1/2¢
Machinery Steel..... 11¢ @ 12¢
Spring Steel..... 4¢ @ 4 1/4¢
Common Horse Nails..... 10¢ @ 11¢
Railroad Spikes, 3 1/2 x 6-16..... 2 1/2¢ @ 2 3/4¢
Perkins' Horse shoes, per keg of 100 lb..... \$4.75 @ 5.37 1/2
" Mule shoes..... 5.37 1/2

R. C. HOFFMAN & Co., Pig and Railroad Iron Merchants, No. 21 South Frederick Street, report us as follows, under date of April 17: The Iron market continues quiet, purchases being made for immediate use only, and without any material change in prices. We quote prices as follows:

Baltimore Charcoal Wheel Iron (all Baltimore Ore)..... \$28.00 @ 29.00
Virginia C. B. Char. Wheel Iron..... 28.00 @ 29.00
Anthracite No. 1..... 23.00 @ 24.00
No. 2..... 20.00 @ 22.00
" No. 1..... 18.00 @ 19.00
" White and Mottled..... 15.00 @ 16.00
Charcoal C. B. Blooms..... 50.00 @ 55.00
Refined Blooms..... 45.00 @ 47.00

SAN FRANCISCO.

J. W. HARRISON, Coal and Metal Broker, 204 California street, reports as follows, under date of April 7, 1883: Pig Iron.—The prices for leading are a little off, with a tendency to still lower figures. The arrival of 1500 tons of Scotch on one vessel this week has somewhat softened prices for spot. Foundrymen anticipate a profitable trade this coming season, and are ordering liberally for future loading.

To arrive.
Eglington..... \$25.75
Glenbrook..... 25.75
Shotts No. 1..... 26.75
Clay Lane, White..... 25.00
American 800..... 31.00
Spot.
\$26.00 per ton.
27.00 "
29.00 "
21.00 "
31.00 "
Coal.—Although we marked prices down about 25¢ per ton in our last week's review, we have to report a still further decline of about 25¢ per ton for cargoes to be loaded within the next three months. If grain charterers do not advance their views on freights above 60¢ for next season, Coal will remain steady at present quotations, as they leave ships a very light inward freight. The Coal market is gauged by the Australian offering, as it is more freely offered than any other of the foreign Coals. Ships are plentiful there, and it is more contiguous to us than any other British port.

To arrive.
Australian..... \$2.75 @ 7.00
Liverpool Steam..... 7.12 1/2 @ 7.25
West Hartley..... 7.25 @ 7.50
Scotch Splint..... 7.00 @ 7.25
Cardiff..... 7.25 @ 7.50
Lehigh Lump..... 13.00 @ 13.25
Cumberland, bulk..... 11.25 @ 11.50
Egg, Hard..... 12.25 @ 12.50

Our English Letter.

Review of the British Iron, Steel, Metal and Hardware Trades.

(From Our Regular Correspondent.)

LONDON, ENG., April 2, 1883.

THE WEEK

which has elapsed since the date of my last letter has been a good deal broken by the occurrence of the Easter holidays, which commenced on the eve of Good Friday, and spoiled a good deal of last week. In scarcely any instance within my knowledge was work resumed earlier than Wednesday last, while in the majority of cases the machinery and men remained inoperative until Thursday. In other cases the whole of the week was lost, employers being pleased, rather than the contrary, to have an excuse for ceasing production, apart from the fact that they know from past experience the poor results, in point of the attendance of the workpeople, of reopening toward the close of a holiday week. The Easter recess was characterized by what has been somewhat humorously described as "a good deal of weather"—that is to say, the elements were raw and generally unpropitious. The east wind of Good Friday was something to be remembered for its iciness, while on Easter Monday we had quite a sharp—albeit, short—snow-storm. Frosts have been of almost nightly occurrence, and in the North the snow-fall has been abnormal for the season. All these things, however, have not been without their attendant advantages. The month of March was dry throughout, and if the old saw that "March dust be worth a guinea a bushel" be true, we ought to have piles of guineas in reserve somewhere. A dry March is accounted the greatest blessing possible to the British farmer, and I am told by some gentlemen of that class that the past month has been almost invaluable to them. They have been enabled to get in their seeds and corn, have kept down weeds and have made up a great deal of the time lost during the wet winter and autumn. Further, they truthfully state that the cold weather has kept back the fruit trees and other vegetation in splendid fashion, whereby said vegetation and trees will not only have been strengthened, but will run fewer risks from the late frosts of the season. All this is of

good omen, for there can be no question whatever that we depend on an enormous extent upon our agriculturists. Until their prospects improve we cannot hope to forge ahead with any degree of rapidity; when they get a fair start, then all our manufacturing industries cannot avoid following suit. Within the past few days the weather has become remarkably sunny and warm. As I write I sit in a glow of glorious sunshine, which must benefit all nature, as well as do much toward setting in motion the springs of trade.

THE IRON MARKETS

have been very quiet, as you will have inferred from the preceding remarks. In scarcely any quarter have the changes recorded been momentous, and the volume of business done has been quite limited. The holidays, falling simultaneously with the end of the quarter, have emphasized the tendency to do as little as possible prior to the quarterly meetings, which will take place a few days hence. There is some speculation—as there usually is, in fact, just prior to quarter day—as to the probable course of prices, but, so far as I can learn, there is not the slightest anxiety about the result. As I have pointed out over and over again, the day is past when the seven or eight marked-bar houses of South Staffordshire had it in their power to fix quotations as they thought fit. They still have a certain amount of influence, but it is of a passive, and not of an active, nature. Their action is mainly a result, not a cause, and what they may do or leave undone has no material influence on the market as a whole. Circumstances are constantly minimizing their influence, not merely because excellent unmarked bars can be had at lower prices than theirs, but because the growing use of steel is slowly, but surely, supplanting their special products. Yet again, they cannot agree among themselves, two at least of the "marked" iron houses having for a long time past refused to follow the lead of Lord Dudley and Messrs. Barrows & Sons, who are the principal producers of this grade of iron. (Lord Dudley himself, I may remark parenthetically, is quite incapacitated from taking a serious part in any kind of business, although he is not so bad as he has been represented to be in some quarters.) What may happen at the forthcoming gatherings I do not pretend to be able to foretell, yet I should be vastly surprised were any change of importance to be declared. Marked bars stand at £7.10/11 ton, with the usual 12/6 extra for Lord Dudley's Round Oak Iron, and at those figures I anticipate they will remain. Certainly no advance could be supported, and I suppose the ironmasters will not move in the other direction, notwithstanding the lower rate of wages declared by the Arbitration Board's accountants. Cheaper fuel and wages may cause some of the producers of medium and common iron to shade off their present prices, especially if there should be the temptation of large orders, but I think it open to question whether prices of most kinds of ordinary merchant iron are not now about as low as they will be any time these next three months.

There are vague rumors afloat as to the probable presence of buyers from the United States at the Birmingham meeting, an impression having gained circulation that your consumers of sheets, hoops, cotton ties, wire rods, tin plates, &c., will be glad to feel the pulse of the market, preparatory to the placing of orders for delivery on and after July 1st next. Of the probabilities of this rumor I confess myself wholly unable to judge in advance, but I shall certainly watch the happenings at Birmingham with added interest by reason of the expectations thus awakened. At present I can only say that I have very little evidence either pro or con.

In the crude iron making districts there have been no alterations worthy of special mention, save a steady giving way of warrants at Glasgow. This has happened despite the equally steady decrease in Connal's stocks, and in the teeth of fair shipments, good local employment and the high values of makers' brands. The public is evidently losing faith in Scotch warrants as a speculative medium, and in the absence of outsiders the "ring" have insufficient vitality to keep the game well alive. The strike of coal miners in the East of Scotland has extended its area since I last wrote. In Mid and East Lothian about 1000 men are out in opposition to a reduction in wages of 10%.

The coal miners of Fife and Clackmannan have determined to restrict their labor to five days of eight hours each weekly, commencing next week. Should this movement assume wider proportions, it must have a weighty influence on iron before long. The Middlesbrough market is extremely dull and flat. At a meeting of the North of England Board of Arbitration, held at Darlington on Thursday, March 29, it was stated that the men at the different works had agreed to the propositions submitted at the previous meeting with regard to wages and restriction of output. The arrangement came to was that for six months the present rate of wages should be continued, and that for the following three months Mr. Dale's sliding scale of one-sixth above shillings for pounds should be put in operation to the end of the year. It was also decided that as it was desired to effect a lessened production of finished iron, with a view to ascertain if such reduced make could be disposed of at higher prices, work should be limited to ten shifts per man per fortnight, or five days per week, till the end of the year, provided that all the works connected with the trade could be got to carry out the plan, as the men asserted would be the case. It will be most interesting to note the outcome of these novel and daring participations of workmen in the practice of restriction.

On the West Coast matters are virtually unchanged, but with no worse tone than that last noted. Elsewhere crude iron is slow of sale and not quite steady in price. As to ordinary finished iron I have already had something to say, which I may supplement by remarking that transactions are few in number and unimportant. Iron rails and blooms are neglected and quite nominal. Old rails are only inquired for on home account; they are firmly held for more money by the railroad companies. Heavy wrought scrap is dull at £7.6 @ 59/11 ton, f.o.b.

London, &c., and the only sales for your market of which I have heard have been of small lots for San Francisco. Old railway leaf spring steel is dull at £1.15/16 upward per ton, f.o.b. Crop ends are 60/11 ton, f.o.b., net cash, Wales, but stocks are said to be low.

STEEL RAILS

are steady at £5 @ 55. 7.6 1/2 ton for ordinary flange sections, &c., of 50 lb yard and upward. Many of the best makers are now well sold ahead, and do not care to quote far forward. Many optional orders have been placed by home roads at low prices and with long-dated deliveries. At the annual meeting of the shareholders of Charles Cammell & Co., Limited, Sheffield, last week, Mr. George Wilson, chairman and managing director of the company, in alluding to the new mills, &c., at Workington, said: "Take the largest concern in this country for rail-making. The steel works, with the furnace plant attached, have cost about £900,000, and they turn out 5000 tons of rails per week, which is equal to an expenditure of £1.50 1/2 ton per week of make of rails. Take another—the largest works on the West Coast of England. They have cost about £600,000, and I am told they have never made more than 2200 tons of ingots per week; but I will be generous, and give them 2500 per week of finished material. Their actual expenditure is equal to £2.40 1/2 ton per week. Take another works, which are represented to me to be the most economically constructed of their kind on the West Coast. They have cost about £300,000, and I will give them a total of 2000 tons of finished material, which, however, they have never reached. This is equal to £1.50 1/2 ton per week actual output. Now, our works and furnaces at Workington, when they are completed, will cost about £270,000, but I am going to throw in the whole working capital as well, and call it £350,000, so as to provide for every contingency that can arise in the way of costs, and we shall turn out every week 3000 tons of rails, which gives us an actual expenditure of £1.16 1/2 ton per week, as against £1.50, £2.40 and £1.80."

The Dronfield mills turned out 36,000 tons of rails during the last four months' working there. They are now undergoing removal to the new site.

SCOTCH PIG IRON

continues quiet, as already noted, yet makers' brands do not show a decline in proportion to the weakness of warrants. The labor troubles, mentioned elsewhere in this letter, are causing some anxiety, but the advent of warmer weather will probably tend to the advantage of the employers, by lessening the demand for house fuel. There are 111 furnaces at work in Scotland (including 7 on hematites), against 107 a year ago. In Connal's Glasgow stores there are 585,059 tons (a decrease last week of 1431 tons), as compared with 629,819 this date 1882. Shipments to date this year have been 129,401 tons, or 5769 tons below those of the corresponding period of 1882. To Canada 70 tons and to the United States 1500 tons were sent last week. Importations of Middlesbrough pig iron into Scotland to date have been 55,831 tons, a decrease of 16,625 tons this year. Writing from Glasgow on March 30, James Watson & Co. said: "The iron market has been very dull and weak, the price of warrants having receded to 47/11 ton. The demand for makers' iron continues exceedingly quiet, although the quotations for special brands are still well maintained. The Middlesbrough iron market is in a similar position to this one, and No. 3 is now quoted at 40/11 ton. On Tuesday the warrant market here fluctuated between 47/6 and 47/7 1/2 ton, and on Wednesday it receded to 47/4 1/2, cash. Yesterday the price still further declined to 47/1 1/2, and to-day it touched 47/1, closing with buyers at 47/0 1/2, sellers asking 47/1 ton. The shipments last week were 12,421 tons, as compared with 12,375 tons for the corresponding week of last year." We quote:

	No. 1.	No. 3.
G. M. B., at Glasgow	40/11	47/1
Clyde, " "	39/11	46/11
Coltness, " "	38/11	45/11
Langloan, " "	37/11	44/11
Gartsherrie, " "	36/11	43/11
Summerlee, " "	35/11	42/11
Caldar, " "	34/11	41/11
Carbros, " "	33/11	40/11
Glenarnock, at Ardrossan	32/11	39/11
Edlington, " "	31/11	38/11
Dalmellington, " "	30/11	37/11
Shotts, at Leith	29/11	36/11
Kinnell, at Bo'ness	28/11	35/11
Carron, at Grangemouth	27/11	34/11

MIDDLESBROUGH PIG IRON

is very easy, with only a very moderate amount of business on hand in the open market. The shipments are improving, however, and, as the home deliveries are good, it is generally believed that bottom prices have been reached. The plate mills are in receipt of additional orders from the shipbuilders, and are rather firmer as regards prices of ship-plates. For No. 3, 40/11 @ 40.6, are quoted, the lower rates by merchants. For G. M. B., f.o.b. makers' wharves in the Tees, net cash, 10th of following month, less 2 1/2 %, current rates are:

	No. 1.	No. 2.	No. 3.
No. 1 Foundry	44/6	Mottled	39/6
" "	42/6	White	38/6
" "	40/6	Refined Metal	36/6
" "	38/6	Kentledge	34/6
" "	36/6	Cinder	32/6

HEMATITE AND BESSEMER PIG IRON

are virtually unaltered on the basis of 51/11 @ 53/11 for mixed lots of West Coast hematites and makers' brands, as under:

	No. 1.	No. 2.	No. 3.
Cleator	56/11	53/11	50/11
Lonsdale	55/11	52/11	49/11
Workington	54/11	51/11	48/11
West Cumberland	53/11	50/11	47/11
Lowther	52/11	49/11	46/11
Moss Bay	51/11	48/11	45/11
Distington	50/11	47/11	44/11
Harrington	49/11	46/11	43/11
Solway	48/11	45/11	42/11
Maryport	47/11	44/11	41/11

North of England hematite iron of this class, f.o.b. Cumberland ports, &c., is:

	Ordinary	Bessemer
No. 1	54/6	53/6
No. 2	53/6	52/6
No. 3	52/6	51/6
No. 4 Foundry	51/6	50/6
No. 4 Forge	50/6	49/6
Mottled	49/6	48/6
White	48/6	47/6

TIN PLATES

remain in a very dull and depressed condition, some measure of which is doubtless due to the wholesale "slaughtering" of your market indulged in a short time ago by two

rival "big" houses on this side, who each threw heavy quantities of plates into the United States ports in order to damage the other. Henry Rogers, Sons & Co. write me from Liverpool as under: "Tin plates are without any special feature. Charcoals are steady. Cokes have been firm at 16/ @ 16.6 for BV grade, and the lower brands at 3d. less. There is a large inquiry for waster cokes, which are realizing 14/9 @ 15/11 box, and are therefore comparatively much dearer than perfects. The general demand is poor, considering the season of the year, and according to the latest advices from New York they are selling there at proportionately lower rates than here. 'It is a long lane that has no turning,' but it is difficult to predict, with regard to this industry, when the desired point, now so long looked forward to, will be reached. At present there are no immediate signs of a revival, nor does there seem any probability of prices materially declining." In London, I. C. cokes of ordinary quality are 15/9 @ 16/11, and wasters 14/3 @ 14/6 1/2 box.

FREIGHTS

are almost normal to your Northern ports. Pig iron, Glasgow to New York, by regular steamer is called "easy" at 5/11 ton, which means, I suppose, 4/ @ 5/11 really. East Coast and Wales rates for iron and steel are 6/6 @ 8/11, and London 4/ @ 7/6 by steamers. Liverpool to New York for pig iron is nominal at 4/ @ 5/11, while Liverpool to Philadelphia by American Steamship Co. has advanced from 7/ to 7.6 and 8/11 ton. Rates of freight by sailing vessels for pig iron from Glasgow are: Montreal, 12/6; New Orleans, 15/ (East Coast, 9/); New York, 12/6; Philadelphia, 12/6 (East Coast, 10/); Portland, 13/; Providence, 12/6; San Francisco, 20/; Baltimore open to offers.

FOREIGN.

FRANCE.

(Moniteur des Interets Materiels)

PARIS, April 2, 1883.—Metals.—Business is not what it ought to be by this time; it will take some time ere confidence is fully restored. Field work is also retarded by unfavorable weather. Metals have been dull, leading to a general decline. We quote: Copper, Chili Bars, 168 @ 171.25; Ingots and Slabs, 176.25; Best Selected, 178.75, and Pure Copper Ore, 170.75. France, 190 kg.; Tin, Banca, 263.75; Billiton, 268.75; Straits and Australian, 257.50, and English, 257.50; Lead, 33.25 @ 34, and Spelter, 40.50 @ 41.50. Iron.—The bankers of Paris have curtailed the advances they have hitherto made to building companies in this city. The result is that a good many of them will have to suspend operations wholly or in part this year, and of course the consumption of structural iron will in this manner be notably curtailed, which can hardly fail to affect the price as well as that of other sorts. So far the market keeps tolerably steady, however, at 15.50 francs Merchant, as well as Flooring, 24.50 Sheets, and 27 Wire Nails, No. 18, in bulk. At the North the Valenciennes meeting of blast-furnace owners has come off, and at the same time that of rolling-mill owners. Curtailed production has been resolved upon without a discharge of workmen. Merchant iron is maintained in the North at 18 francs 1/2 kg. In the Ardennes, on the other hand, rolling-mill products still do not run so freely. It has been resolved to suspend work on the whole, and the outlook is the reverse of bright. Meanwhile Pig Iron keeps steady; we quote English, 54.50 @ 55 francs; Domestic Foundry, 7.25 @ 7.50. Puddling is retarded, and the price for local work on hand, and so have the local motive shops, but on the whole, the outlook is the reverse of bright. Meanwhile Pig Iron keeps steady; we quote English, 54.50 @ 55 francs; Domestic Foundry, 7.25 @ 7.50. 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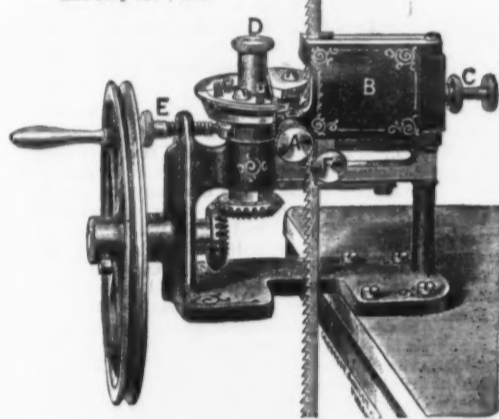
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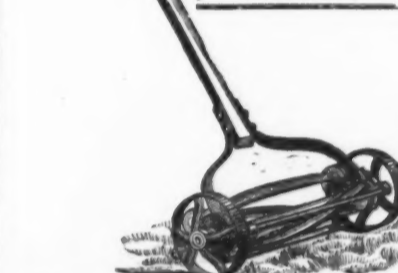
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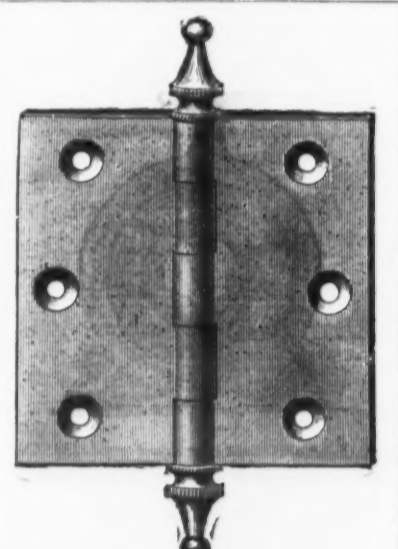
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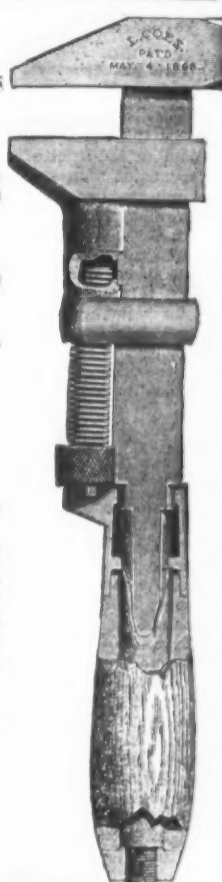
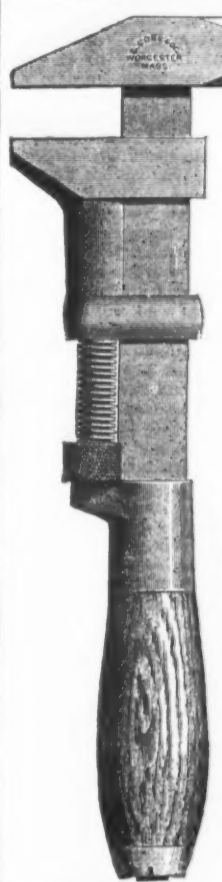
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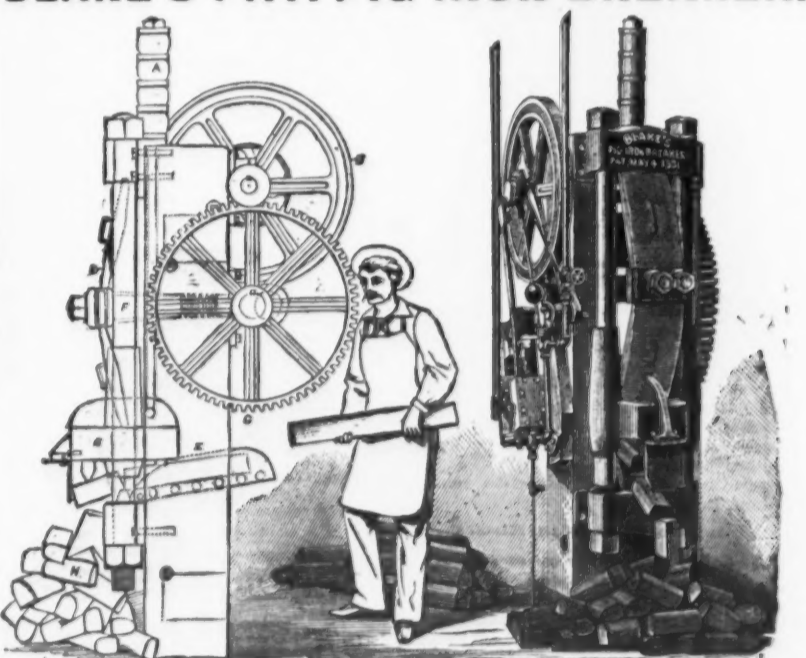
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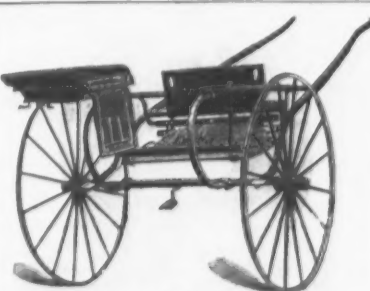


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SCIENTIFIC AND TECHNICAL.

The Brickwork of Chimneys.

In a communication to the *Deutsche Bauzeitung*, Herr Eckhardt has expressed his opinion that the cause of crevices being formed in the brickwork of chimneys is the difference of temperature between the inner and outer surfaces. While in many cases in an ordinary factory chimney the mantle has internally a temperature of nearly 600° F., the external temperature is only about 60° on an average, the difference of expansion which is thus occasioned producing the cracks referred to. He dwells upon the use of iron hoops, and remarks that its object and result are not, strictly speaking, the prevention of expansion, but rather the attaining in the outer brickwork of a uniform distribution of the tension, and the prevention of its concentration at certain points. The question whether wrought-iron rings in the inside of a mantle are liable by their own expansion to produce cracks has been for some time under discussion in German technical circles. A short time ago, Doctor Tomei recorded, in the journal referred to, his opinion that the binding of chimneys by means of iron inside the masonry was a measure only to be recommended in exceptional cases, and with the observance of special care in its execution. He considered that the external binding of brickwork was, however, a question which was to be regarded in a different light. Herr Eckhardt, though not founding his remarks exactly on those of Dr. Tomei, further illustrates them by saying that if ironwork placed internally fails to prevent cracks, and even produces them, its employment in that way is not only superfluous, but injurious. If rightly constructed, he considers that for resisting the effects of the wind no hoops are required by a chimney. In further elucidation of the theory that internal hoops are unsuitable, he remarks that the ironwork should, as a matter of course, not be exposed to a high temperature; and he maintains that all rings inside masonry must, under these circumstances, be subjected to the influence of heat. If they have not sufficient space for their expansion they exercise a pressure upon the external brickwork, and thereby produce cracks. From the facts thus quoted Herr Eckhardt deduces the recommendation that in order to provide against the results of the difference in temperature to which allusion has been made, double walls should be constructed. He refers to the chimneys for circular furnaces which have been designed on this principle by Herr Hoffmann. He uses double mantels, each only half a brick in thickness, which are united by vertical ribs of the same thickness. Inside the chimney is an isolated mantle, half a brick thick, which is built up to the height of 11 to 22 yards, according to temperature ruling in the chimney. This mantle is exposed to the most intense action of the heat, and from the nature of its construction is not injuriously affected by any extension which takes place. Herr Eckhardt claims for this method of construction the subsidiary advantage of economy in fuel, and adds that his personal experience confirms him in the opinion that it is the only system by the use of which iron hoops can be completely dispensed with.

The Decay of Bricks.

Recent observations of M. Parize tend to show that the weathering of brick walls into a friable state, which is usually attributed to the action of heat, moisture and frost, is in reality due to a microscopic creature, the action played by the weather being only secondary. M. Parize examined the red dust of crumbling bricks under the microscope, and found it to consist largely of minute living organisms, and a sample of brick dust taken from the heart of a solid brick also showed the same animalcules, but in smaller numbers. The magnifying power of the instrument was about 300 diameters, and every brick showed the same distinctive features, but, in general, the harder the brick the fewer were the organisms.

The Electrical Resistance of Tempered Glass.

Some interesting experiments concerning the above subject were recently made by M. G. Fousseureau, showing that the electrical resistance of glass diminishes considerably on being tempered. On the other hand, annealing tempered glass was found to restore its higher resistance. The same may be said of tempered crystal. The resistance of glass, tempered or untempered, provided the glass is not unduly heated, is found to remain constant.

Armor-Plate Tests in Russia.

The last of an important series of armor-plate tests which were commenced at the close of last year under the supervision of the Russian Government has recently been completed, and a condensed account of the experiments may not be without interest. The trials were made at Ohta, near St. Petersburg, the gun used on the occasion being the 11-inch Aboukoff breech-loader. Various charges were adopted, but the projectile fired throughout the experiments was a chilled cast-iron shell, manufactured at Perm, in the Ural, and weighing 553 English pounds. The plates tested consisted of a steel plate made by Schneider & Co., of the Creusot Works, France, and a compound plate made by Charles Cammell & Co., on the Wilson principle, at their works in Sheffield, England. Each plate measured 8 feet long by 7 feet wide, and was 12 inches thick, the compound plate having a steel face one-third of the thickness. The plates weighed each about 12½ tons, and were backed by 12 inches of timber and a couple of ¾-inch iron plates, supported by diagonal struts. The first shot discharged against the Schneider plate was with 132 pounds of powder at a velocity of 1506 feet. The projectile was smashed, but the plate was broken into five pieces, and was only kept in position by the 12 bolts which secured it to the target. The penetration was 13 inches, or more than through. The second was fired with 81 pounds of powder and a velocity of 1167 feet. The projectile was broken into nine separate pieces, and, besides developing former cracks, the blow produced three new ones from 2 to 3 inches wide. The succeeding round,

which was with the same charge as before, completely demolished the plate. While seven fragments were left hanging upon the shattered backing, one piece, weighing about a ton, was found 13 feet behind the target, and 10 other pieces, weighing three tons together, were scattered on the ground in front. The projectile itself was discovered 740 yards in the rear of the target, and apparently uninjured. The Cammell plate was next tried, the first round with a 132-pound charge. There were a few cracks produced on the face, but concentric and radial, and they were of no importance. The indent was not more than 5 inches. As the plate was only secured to the target by four bolts at the corners, three were broken just behind the plate, the lower right-hand bolt only remaining as a fastening. The second shot, fired with 81 pounds of powder, fractured the solitary fastening, and allowed the plate to slip from the target. The second blow caused a piece of the plate at the upper left-hand corner, 5 inches thick, to break off. This was considered to be due to a local defect in the welding together of the molds forming the iron back, as the welding of the steel to the iron was perfect. The shot also caused a piece of the steel face varying in thickness from 1½ inches to 3 inches to scale off. There were no cracks produced at the back of the plate and the timber was uninjured. The projectile was smashed into small pieces, but as the head remained wedged in the plate and projected about 2 inches outward from the plate, the exact penetration could not be precisely determined. This concluded the tests for the time being, but fresh bolts having in the meantime been sent out to Russia, two additional shots, making four in all, were fired at the plate. The projectiles were completely destroyed, the compound plate remaining almost literally untouched. A few additional hair cracks were produced, while the penetration was insignificant. The result of these experiments would seem to justify the preference shown by the English Admiralty in adopting compound armor, seeing that the Schneider steel utterly collapsed at the third round, while the Cammell plate remained intact after the fourth.

Photographing Sound Waves.

Some interesting experiments relating to the photography of sound vibrations were recently made by the well known German chemist, Professor Boltzman. According to the method devised by him, a small, thin platinum plate was fixed perpendicularly to the center of a thin iron tympan like that of a telephone. Another platinum plate was fixed near the first so as to form a fine slit between them, and this slit was brought into the focus of a collecting lens upon which sunlight fell. After passing through the slit the rays went to a selenium cell which, with two telephones, was in circuit with 12 Leclanché cells. Single sounds spoken to the tympan could be heard. When the rays, after traversing the slit, which varied in width with the vibrations, were rendered parallel and concentrated by a lens upon the selenium cell, the apparatus could be employed as a photophone. Intense sunlight concentrated upon the platinum plate by means of a solar microscope, and an image of the shadow of the platinum plate thrown upon a glass plate prepared with Vogel's emulsion, gave a photograph of the sound vibrations when the prepared plate was rapidly moved in a direction perpendicular to the line of light. It appears that for the vowel sounds the curves produced were simple, while those for the consonants were complex, those for *t*, *m*, *n*, *r*, *p* and *k* resembling the curves formed by König for "r" by his sound flames.

The Forbes Patent Die-Stock.

In the accompanying engravings we present to our readers the Forbes patent die-stock in its most improved form. This tool possesses several excellent features that



The Forbes Patent Die-Stock.—Fig. 1.—The Front of the Die-Stock.

commend it to pipe-fitters. In the first place it is a pipe-cutter as well as a die-stock, and is geared so that it requires but little power to operate, and will cut off and thread pipe of unusually large diameter by hand, one man being able to thread pipe of as much as

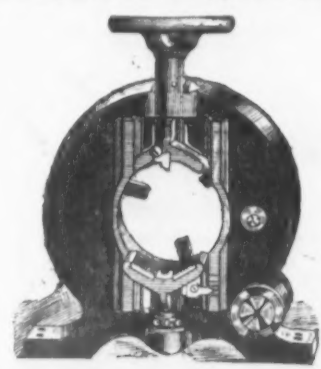


Fig. 2.—The Pipe-Gripping Mechanism.

4 inches in diameter, while the tool may be used for 6-inch pipe. Another advantage is that this tool does not require the usual strong and fixed bench to hold it, but may be bolted to a plank set upon a table or box,

or upon two barrels, or even upon the floor in case of necessity. The tool may therefore be carried to the room where the pipe is being erected, and thus save the loss of time and annoyance of carrying pipe to and from the usual fixed strong bench in the work-room or cellar. Another commendable feature is that bits or chasers are used for threading instead of solid dies, and as these bits are readily removable, their resharpen-



Fig. 3.—Face-Plate Removed and the Bits in Position.

ing becomes a simple matter. By a simple change the stock may be used to cut left-hand as well as right-hand threads, this change consisting in putting in left-hand bits and in replacing the right-hand screw ring with a left-hand one. After a piece of pipe has been threaded, all that is necessary is to turn the head in the opposite direction, and the bits retire from the pipe thread, so that the pipe may at once be withdrawn, which preserves the cutting edges of the



Fig. 4.—Back View of Face-Plate.

bits as well as saves the time usually lost in winding the dies back. Another inconvenience often met with in pipe-threading tools is the clogging of the chips. This is overcome in the Forbes die-stock, there being ample room for the escape of chips as well as for free lubrication, the latter being very essential to the production of smooth and clean threads.

The construction of the device will be



Fig. 5.—Ratchet Wrench for Large Pipe and in Confined Situations.

understood from the following description: Fig. 1 is a general view of the front of the machine, showing the bits locked in position by the face-plate, and showing the gear by which the head is revolved, and the stud of the pinion that revolves it. The hand-wheel is for operating the pipe vise at the back of the machine. Fig. 2 is a back view, show-



Fig. 6.—Face-Plate Removed and the Cutting-off Tool in Position.

ing the mechanism for gripping the pipe. The back of the machine is provided with ways in which the gripping jaws slide. The lower jaw is adjusted for height to suit the size of pipe to be operated upon, and is firmly locked in its adjusted position. It is provided with an index pointer, and the face of the slide-way is marked by lines to suit the different diameters of pipe, so that this jaw may at once be set to the proper height to bring the pipe central to the bits. The lower jaw being set, all that is necessary is, by means of the hand-wheel, to operate the upper one to firmly grip the pipe. Fig. 3 is a front view, with the face-plate removed, and showing the bits in position. Fig. 4 is a back view of the face-plate. Fig. 6 is a front view of the machine, with the face-plate and chasers removed, and showing a cutting-off tool in position. Fig. 5 is a ratchet wrench for use on large sizes of pipe, and is exceedingly useful in cases where the pipe is in the ground, and the die-stock is used to cut it off and thread it without removing it from its position.

The No. 1 die-stock threads pipe from 1 to 2 inches in diameter, but has no cut-off. The large gear has cut teeth, and the pinion is of steel, working in gun-metal bearings. The gripping jaws are fitted with cast-steel faces, hardened. This improved tool is manufactured by Messrs. Forbes & Curtis, at Bridgeport, Conn. The shop for its construction has been fitted up with improved machine tools and appliances, all parts of the die-stock being made to standard gauge, so that any part can be readily supplied when necessary.

Referring to the Amsterdam Exhibition, which was mentioned in our columns some time since, it may be of interest to state that a committee of Amsterdam journalists has been organized in order to promote the comfort and to lighten the task of Dutch and for-

sign newspaper correspondents during their stay at the Exhibition. Under the supervision of this special committee, the Executive Committee of the Exhibition will erect a pavilion on the grounds, which will contain a reading, writing and drawing room, an office and several smaller rooms. In the reading-room the committee, with the co-operation of different publishers, hope to place a collection of the leading works about Holland and India, and all such books as may be of use to foreign visitors. The pavilion will be situated in the immediate neighborhood of the post and telegraph offices, and will be connected with the central office of the telephone company.

INDUSTRIAL ITEMS.

NEW HAMPSHIRE.

S. Cole & Son, iron foundries and machinists, Lebanon, have made extensive additions to their buildings the past year, and now have one of the most complete foundries and machine shops in New Hampshire. They make a specialty in the building of trip-hammers for scythes and other forging shops, and have recently put several of them in the scythe works at New London. This firm also deal largely in lumber.

MASSACHUSETTS.

The Brainard Milling Machine Co., Hyde Park, are running on full time, with full complement of hands and plenty of orders. They have commenced work on the foundation of a building to be erected as soon as possible, to be used for an office and supply-room adjoining their factory.

The Eagle Cotton Gin Co., of Bridgewater, did a larger business in the South last year than during any previous year since the war.

Another manufactory of silver-ware is contemplated at New Bedford.

The Ellis Foundry Co., of South Carver, have recently received an order from San Francisco for 800 stove kettles.

CONNECTICUT.

It is expected that the new and large factory of the Bridgeport Malleable Iron Co., at Bridgeport, will be booming in July next.

NEW JERSEY.

The copartnership heretofore existing between H. M. Strieby and W. S. Ward, under the firm name of Strieby & Ward, has recently been dissolved. The business of the firm named was the manufacture of carriage builders' hardware at Newark, N. J. The business is continued by H. M. Strieby, of the old firm, under the style of H. M. Strieby & Co. The dissolution of this firm will make no change in its business. We understand that increased facilities are contemplated, and that the well-known reputation of the firm for character and quality of goods will be strictly maintained.

PENNSYLVANIA.

The Columbia Agricultural Works, of B. F. Stoner, at Columbia, were burned to the ground on the afternoon of April 13. The structure was a large one, built of brick and frame, and gave employment to about 50 men. The origin of the fire is unknown, but it is supposed to have originated from an explosion of a barrel of benzine. The building and contents are partly covered by insurance. The loss is about \$40,000.

The Reading Iron Works last week closed their sheet mill at the foot of Spruce street, and their rolling mill at the foot of Seventh street, for an indefinite period, owing to the dull state of the iron industry. Between 400 and 500 hands were thrown out of employment.

The West Middlesex Rolling Mill, which has been off for several weeks, on account of a break in the muck rolls, will resume operations on Monday next.

The Easton Lock Works are in full operation and employ 35 men.

After an uninterrupted run of six months the Warwick Furnace recently "damped down," to permit the cleaning of the boilers, six in number. This necessitated a stoppage of four days. To overcome this stoppage in the future a duplicate battery of six boilers is now being made at the boiler works of Sotter Bros. The contract calls for the completion of the work in June. During the year ending April 15th, 1883, with one week's stoppage, this furnace is reported to have produced 20,672 tons of pig.

Work was temporarily resumed at the pipe mill of the Reading Iron Works on Monday last, for the purpose of completing some unfinished orders. Notwithstanding the run will hardly outlast this week, it is to be hoped that additional orders may be secured, so as to keep the mill steadily in work for a long time to come.

The new stove foundry of Messrs. Duncan & Baldwin, of Pittsburgh, in the suburbs of Newcastle, which has been in course of erection during the past winter, is about completed, and was to go into operation on Wednesday last, the first stoves to be turned out the following Saturday. It is one of the largest establishments of the kind in the State. About 150 men will be employed, 90 of whom come from Pittsburgh. Its average daily capacity will be about 85 stoves.

Messrs. Witherow & Gordon, Pittsburgh, agents for the Whitwell hot-blast stoves, state that they have closed a contract for the remodeling of the North Lebanon furnaces, the building of a plant of three modern Whitwell fire-brick, hot-blast stoves, each 20 x 60 feet, with suitable iron chimney, and to remodel their No. 3 Furnace so as to change its production from 300 tons per week, as it is at present, to 1000 tons per week. The plan also embraces the remodeling of their No. 1 Furnace immediately after. They have also contracted for a plant of three Whitwell stoves, each 18 x 60 feet, with corresponding draft stack, with Messrs. Ferguson, White & Co., for their Robeson Furnace, intended to change its production from 250 tons per week to 600 tons; with Messrs. J. & R. Melly for a plant of two Whitwell stoves, each 18 x 60 feet, with chimney, for their 12-foot furnace at Lebanon, by which they expect to very nearly double their output. They are still in nego-

tiation with Mr. Grittinger, manager for Mr. Freeman, and his associates, for the remodeling of the two furnaces of the Bird-Coleman plant. The No. 2 Furnace of this plant was completed only two years ago. Mr. Freeman and Mr. Grittinger contemplate the complete remodeling of this whole plant, dismantling the four large iron hot-blasts they have at present, and all their batteries of boilers, substituting in the position they now occupy six Whitwell stoves, each 20 x 60 feet, with large draft stack for the double plant, increasing the height and dimensions of their furnaces, and building new batteries of boilers, with additional engines, so as to more than double the present output of this plant. The remodeling of the North Cornwall furnaces is to follow.

OHIO.

The Bellaire Window Glass Works, at Bellaire, have their two furnaces, eight pots each, running full, and are turning out large quantities of No. 1 ware. The works turn out between 75,000 and 85,000 feet of glass per week.

The Lane & Bodley Co., Cincinnati, have recently acquired additional factory accommodations, and will soon be able to add 100 men to their working force. They have filled orders during the winter for several stamp-mills, ranging from 10 to 30 stamps.

The Buckeye Works have received an order to ship 300 machines to Australia. Last year 60 binders only were sold there.—*Akron Gazette*.

ILLINOIS.

To facilitate the more rapid handling of their goods, the Chicago Steel Works are placing in an additional railroad track and are building four new furnaces.

The strike of the masons proved unfortunate for the June Mfg. Co., of Chicago, as it stopped all work on their new building, which was within three or four days of completion.

Chas. Kaestner & Co., of Chicago, are building one of the Gates patent pulverizing machines, to be sent to the Black Hills, and are also very busy manufacturing milling machinery.

It is reported that a corporation called the Alton Rolling Mill Co. has been organized, with \$25,000 capital stock, to build a rolling mill in Alton.

The Chicago Wire and Iron Works, a comparatively new concern, have booked within the past week 200 orders for their goods.

The Chicago Smelting and Refining Works are turning out large quantities of nickel-bronze castings for the Sperry Electric Motor and Car-Brake Co. and the Hercules Iron Works, of that city. They have just delivered to the Chicago City Railway Co. 68,000 pounds of white-bronze castings.

Smith & O'Leary's Steam Hammer Forge Works, of Chicago, have lately been increased by an addition to their vice department, in which department they are now very busy.

The Cummer Engine Co., of Cleveland, will soon ship to Messrs. David Suppiger & Co., of Highland, Ill., one of their 250-horse-power automatic engines, with boiler and complete outfit. The company report very flattering prospects for their engine in the Eastern States, and it is understood that they have now orders for about 13 from their Boston agents. Among the orders recently received, we would mention one for a 100-horse-power automatic engine for Messrs. Hardesty Brothers, of Canal Dover; a 400-horse-power engine for the Brush Electric Light and Power Co., of Cleveland; a 150-horse-power engine for the same company, at Kansas City, Mo.; a 16 x 30 engine for Messrs. Boden & Bill, of Ogdensburg, N. Y., together with complete outfit; still another, for Messrs. A. C. Meyer & Co., of Baltimore, and a 125-horse-power engine for Messrs. George P. Frost & Co. (Sheboygan Mfg. Co.), Wisconsin. The contract for building the engine for the Mt. Vernon (Ind.) Mill and Elevator Co. was also awarded to the Cummer Engine Co., who, it is thought, will soon be compelled to enlarge their works, so as to meet the increasing demand for their engines.

MISSOURI.

The Great Western Glass Works, of St. Louis, which were shut down on the 9th of last month, will be started up on the 1st of May—that is, one furnace will be worked from and after the last-mentioned date.

At a meeting last week of the stockholders of the Standard Foundry Co., of St. Louis, it was voted to increase the capital stock of the organization to \$25,000, paid up. The works of the company are now being greatly enlarged by the erection of new buildings, including a new office; a good deal of new machinery, including a boiler, will be put in, and the capacity of the concern increased about 50 per cent.

The Helmbacher Forge and Rolling Mill Co., of St. Louis, are putting in their new pin machines for making car coupling-pins, and report a good demand for links and pins.

MICHIGAN.

The Detroit File Works, of Detroit, are erecting a new 100-horse-power engine and boiler, and are also adding other machinery by which their capacity will be doubled. They report large sales of their goods, and are at the present time actively engaged in filling back orders.

The coke pool out of the Connellsville region between the Baltimore and Ohio and the Pennsylvania Central railroads has reduced the price of freight from the coke region to Pittsburgh from \$1.16½ to \$1 a ton. The rate that has heretofore been asked has been a constant source of complaint on the part of the Pittsburgh furnaces for many years, and has been a rate very largely disproportionate to the rate charged furnaces in other sections for transportation from the coke regions to their furnaces. We presume that the reason for this reduction is the near completion of the Vanderbilt road into the coke region, and not any spasm of virtue that has overtaken these roads. They see

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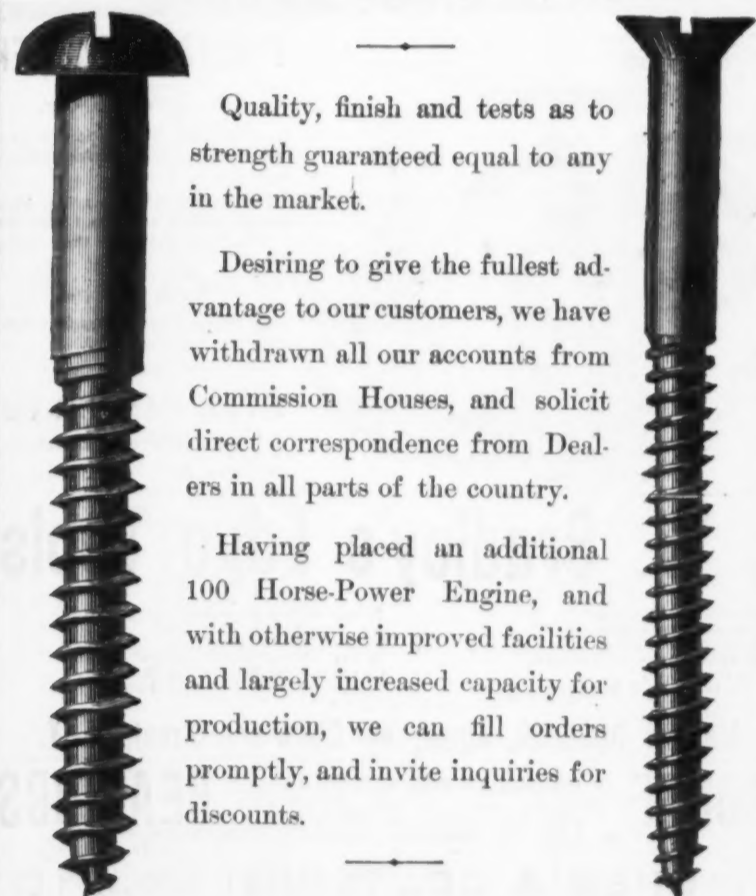
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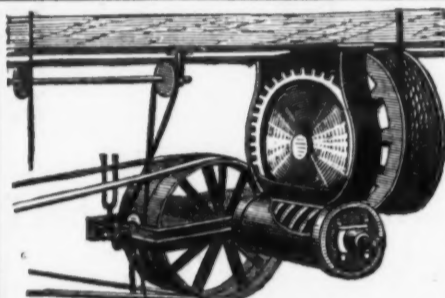
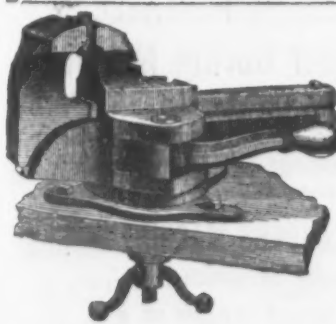
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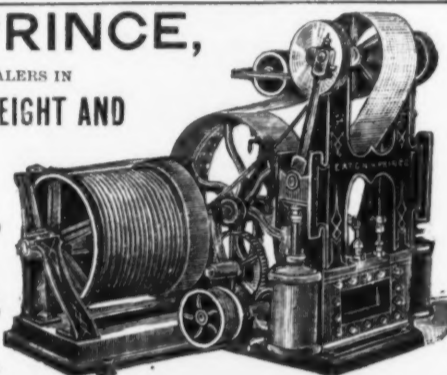


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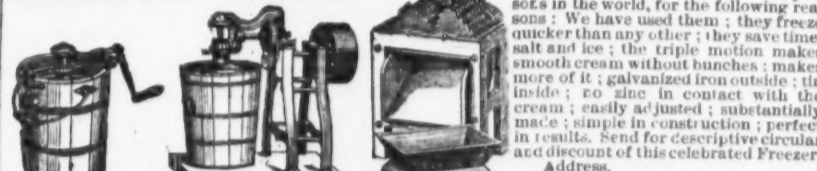
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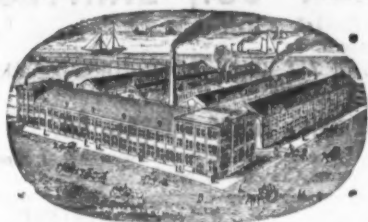
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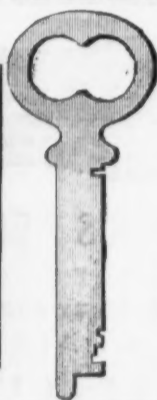
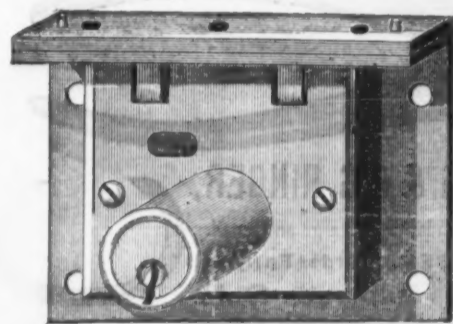
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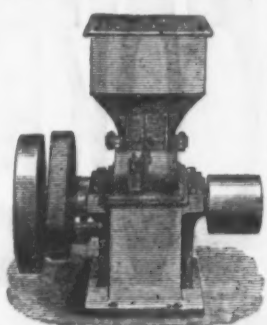
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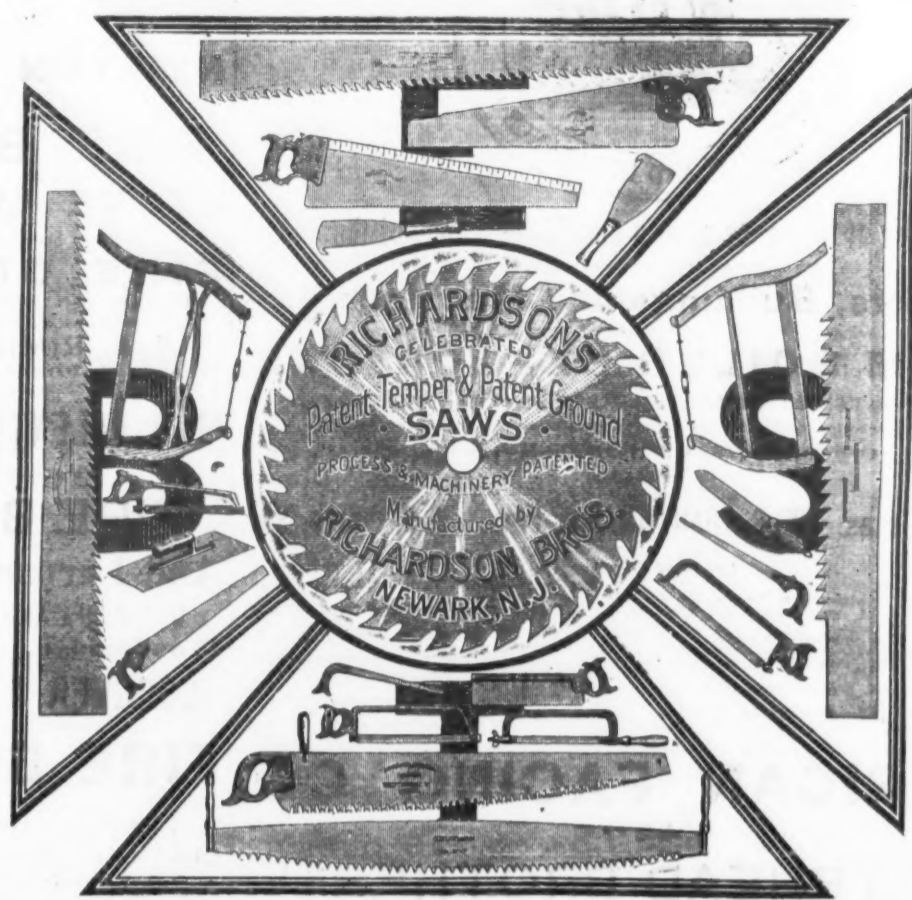
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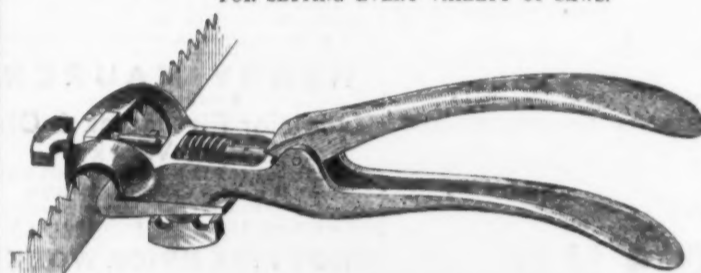
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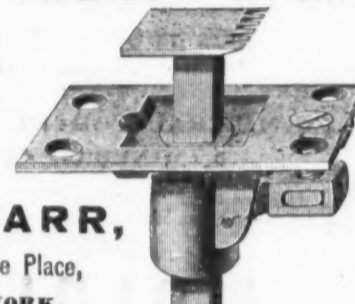
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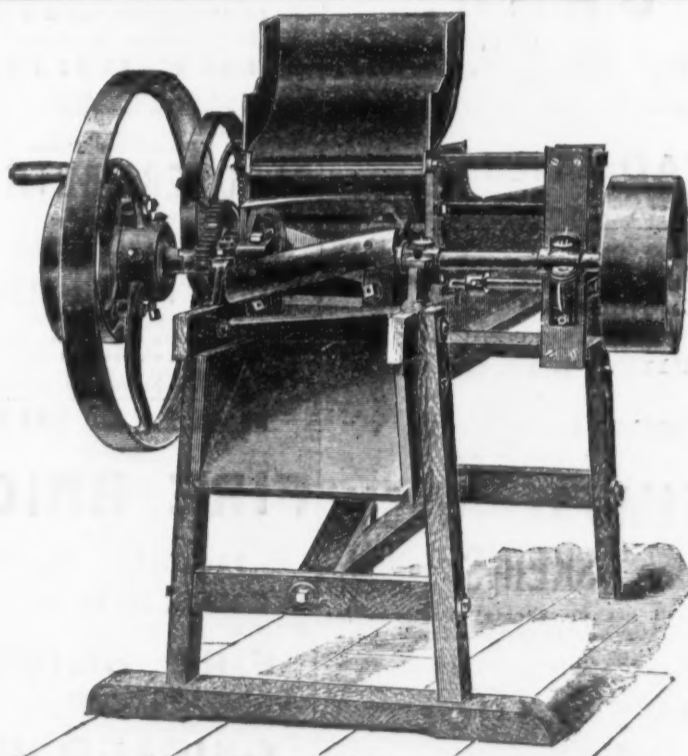
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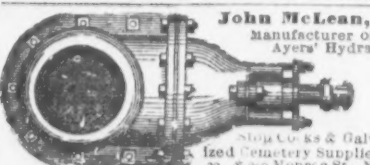
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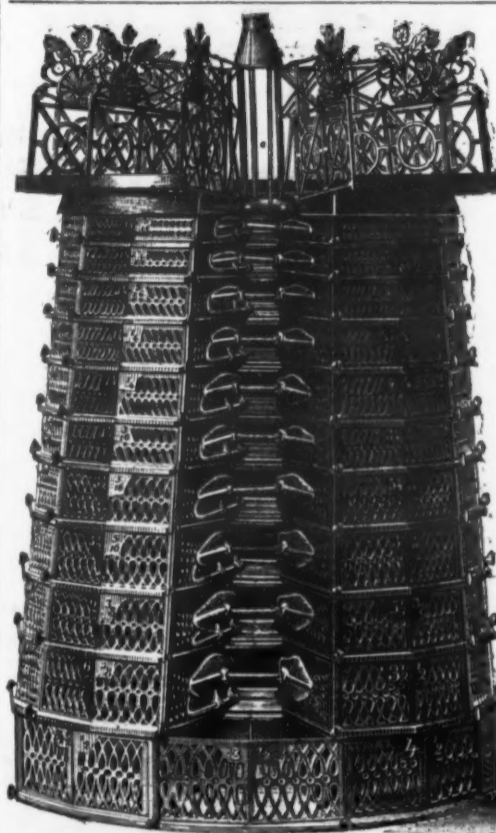
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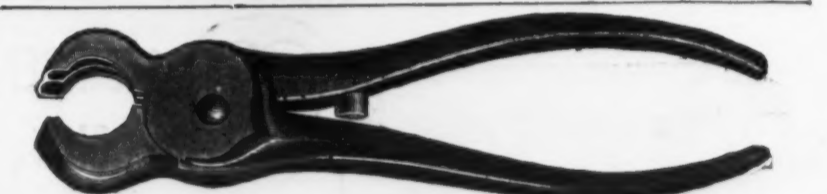
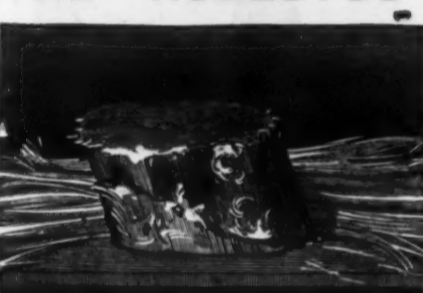
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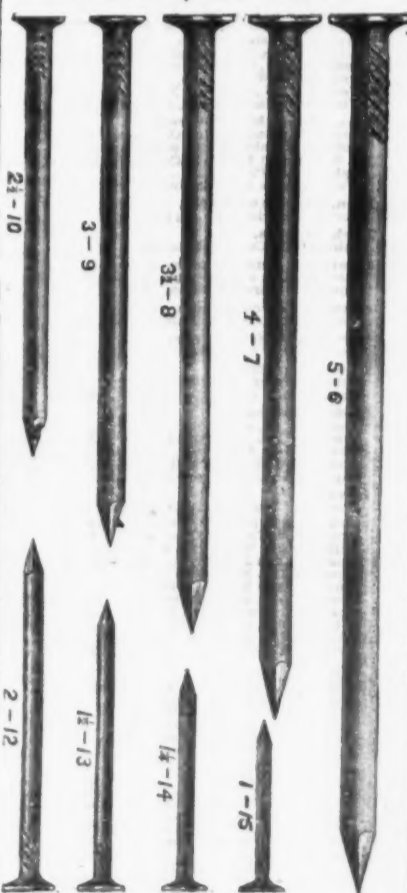
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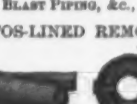
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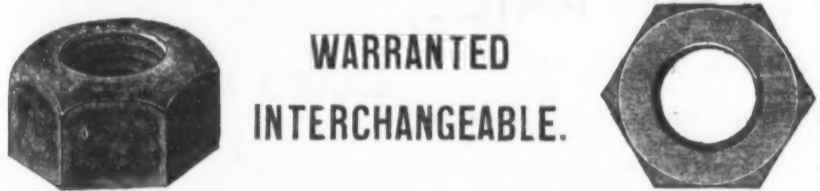
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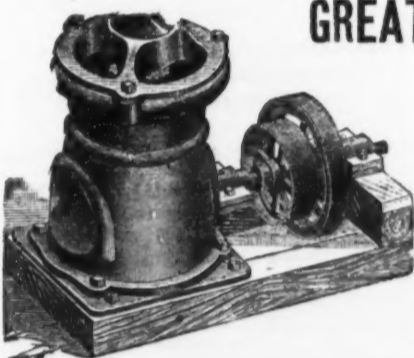


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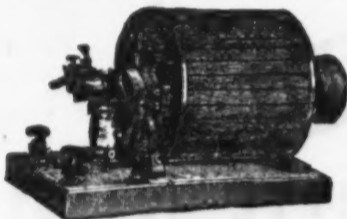
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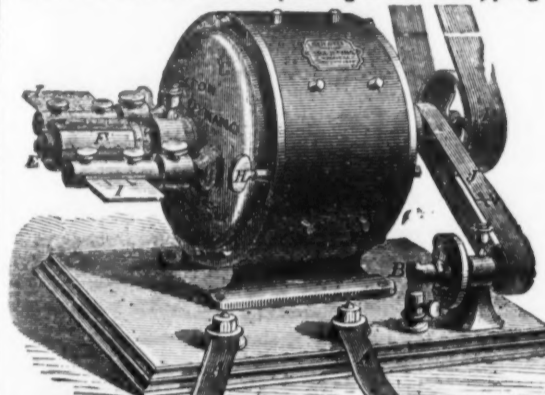
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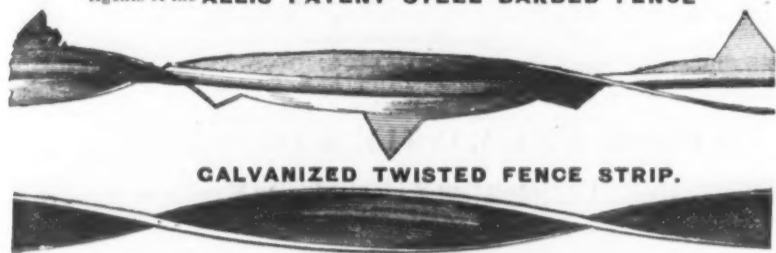
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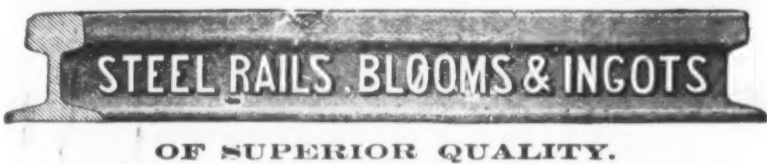
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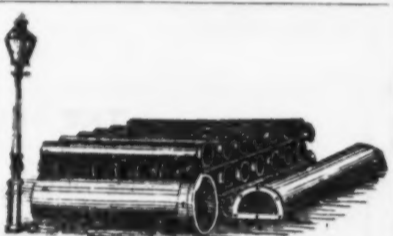
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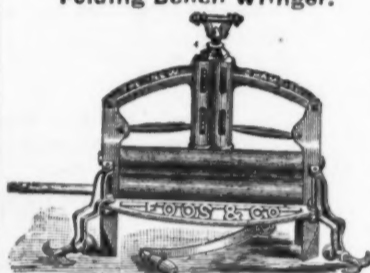
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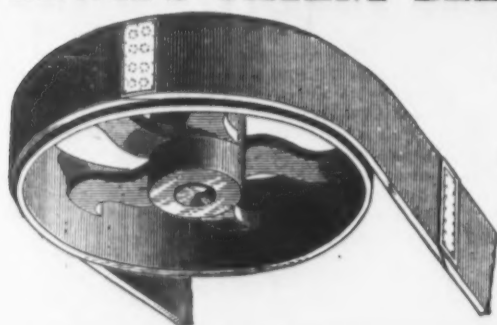
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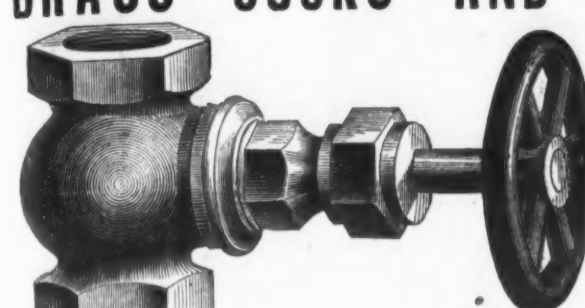
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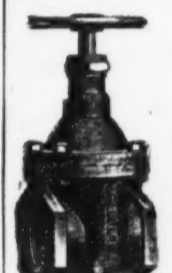
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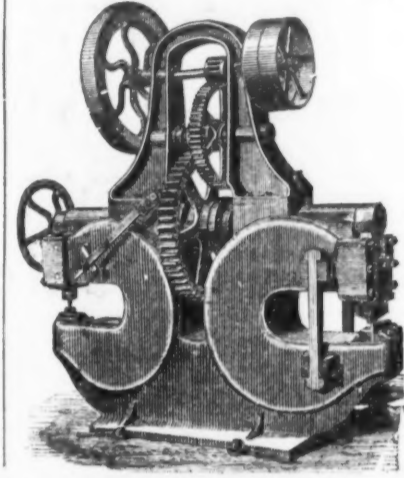
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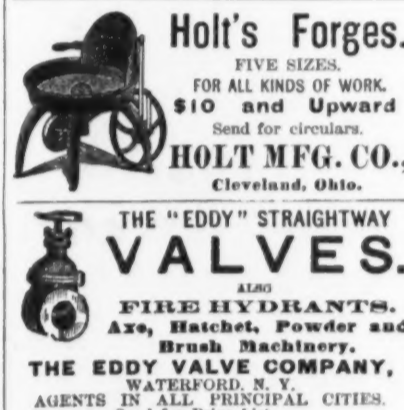


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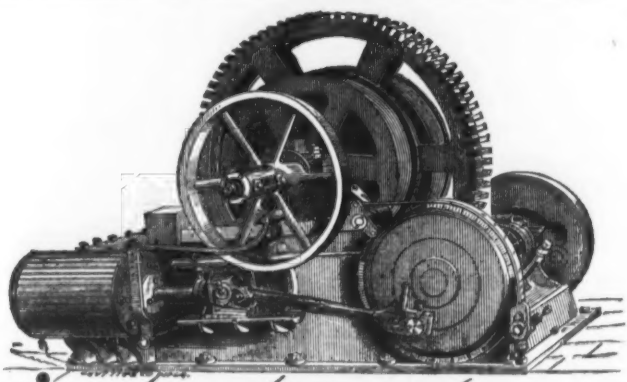


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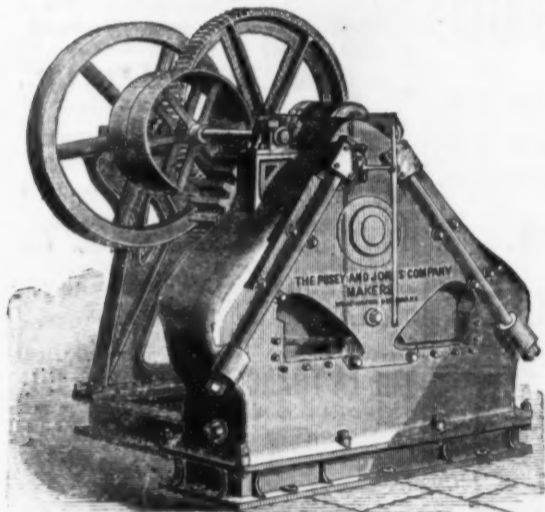
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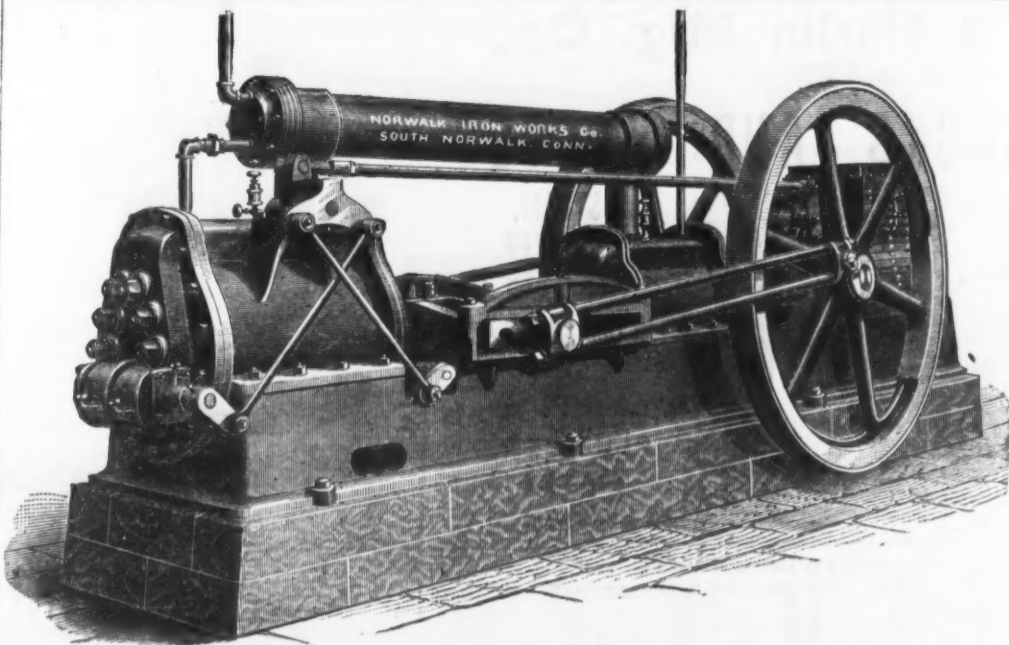
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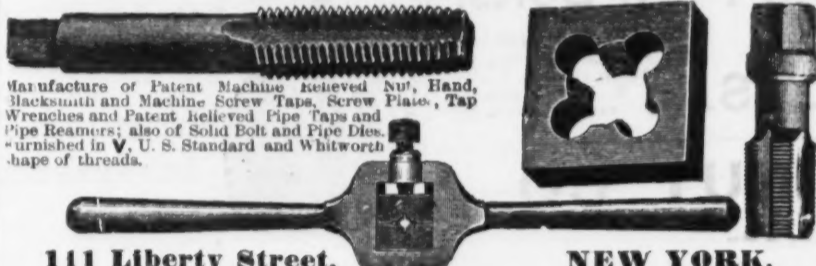
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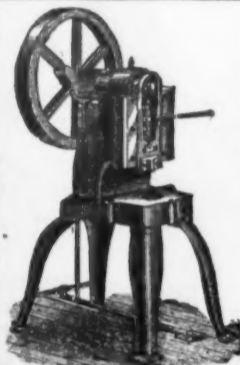
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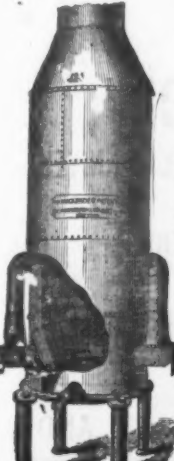
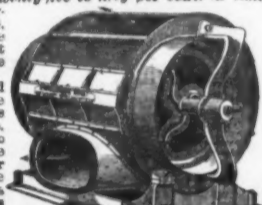
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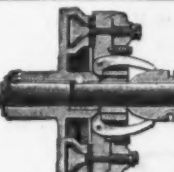
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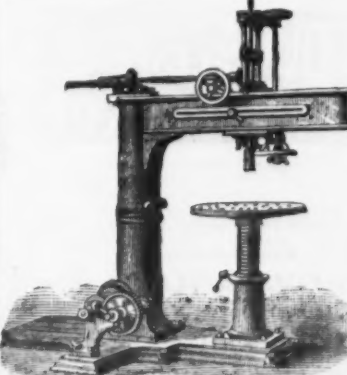


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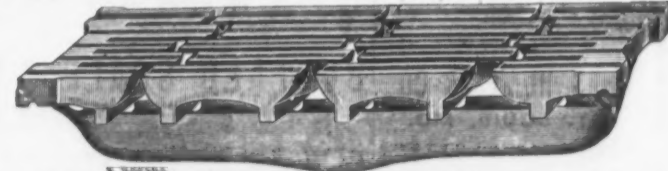
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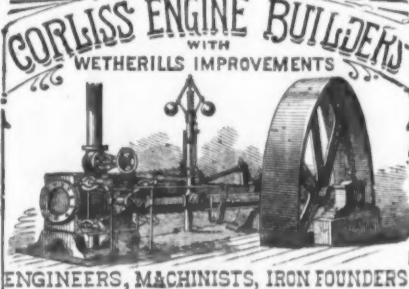
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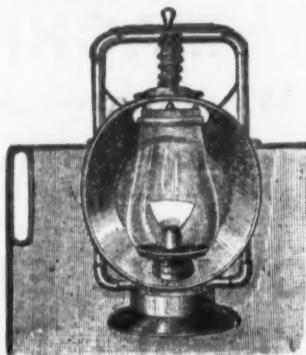
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